OIPE JC10
APR 26 2004
PATENT & TRADEMARK OFFICE

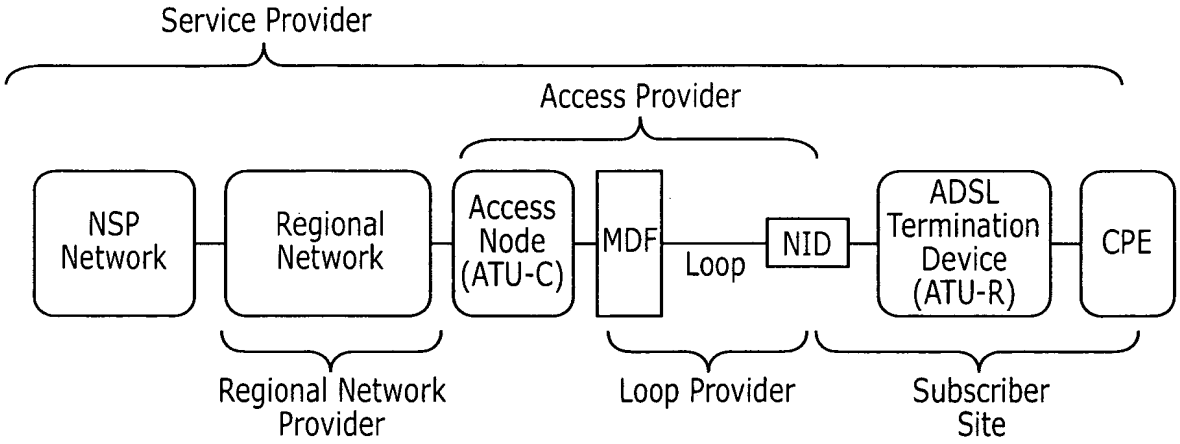


FIGURE 1
(PRIOR ART)

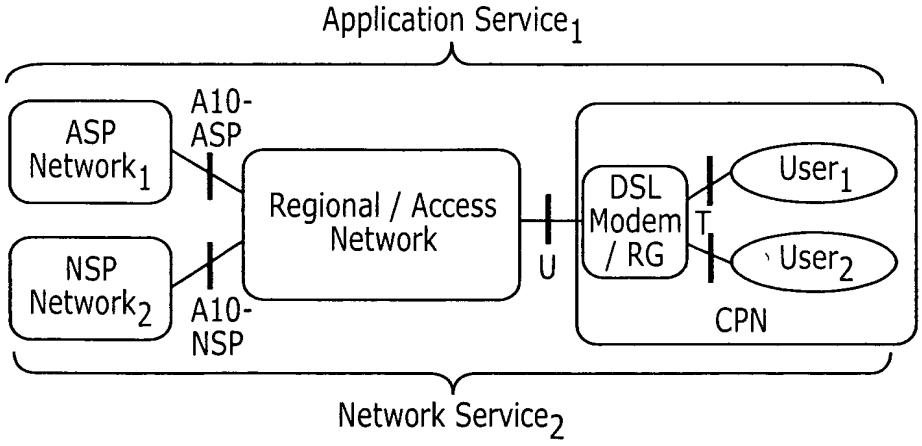


FIGURE 2
(PRIOR ART)

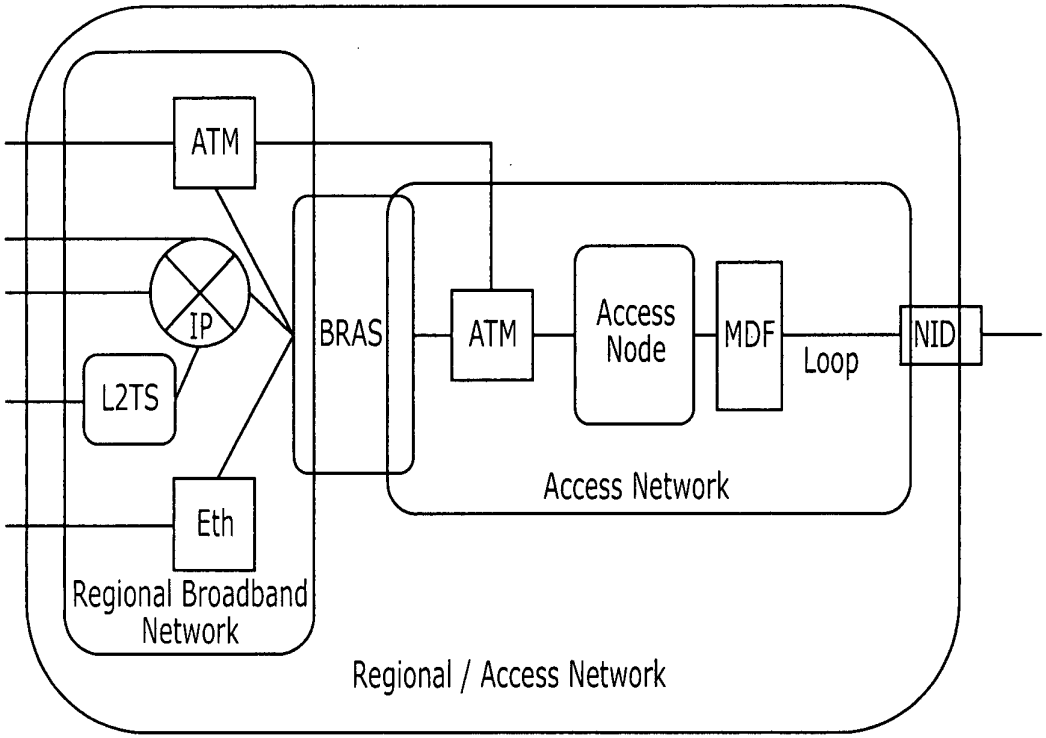


FIGURE 3
(PRIOR ART)

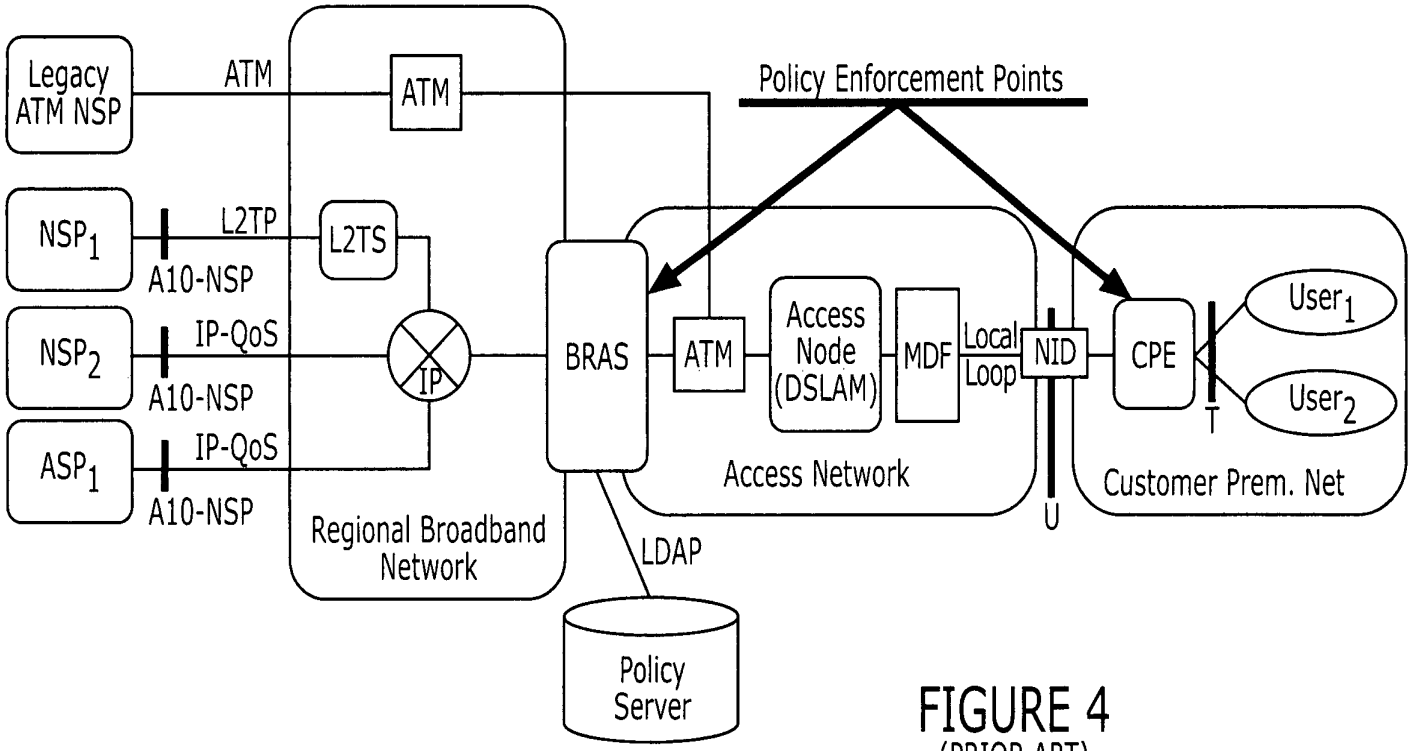


FIGURE 4
(PRIOR ART)

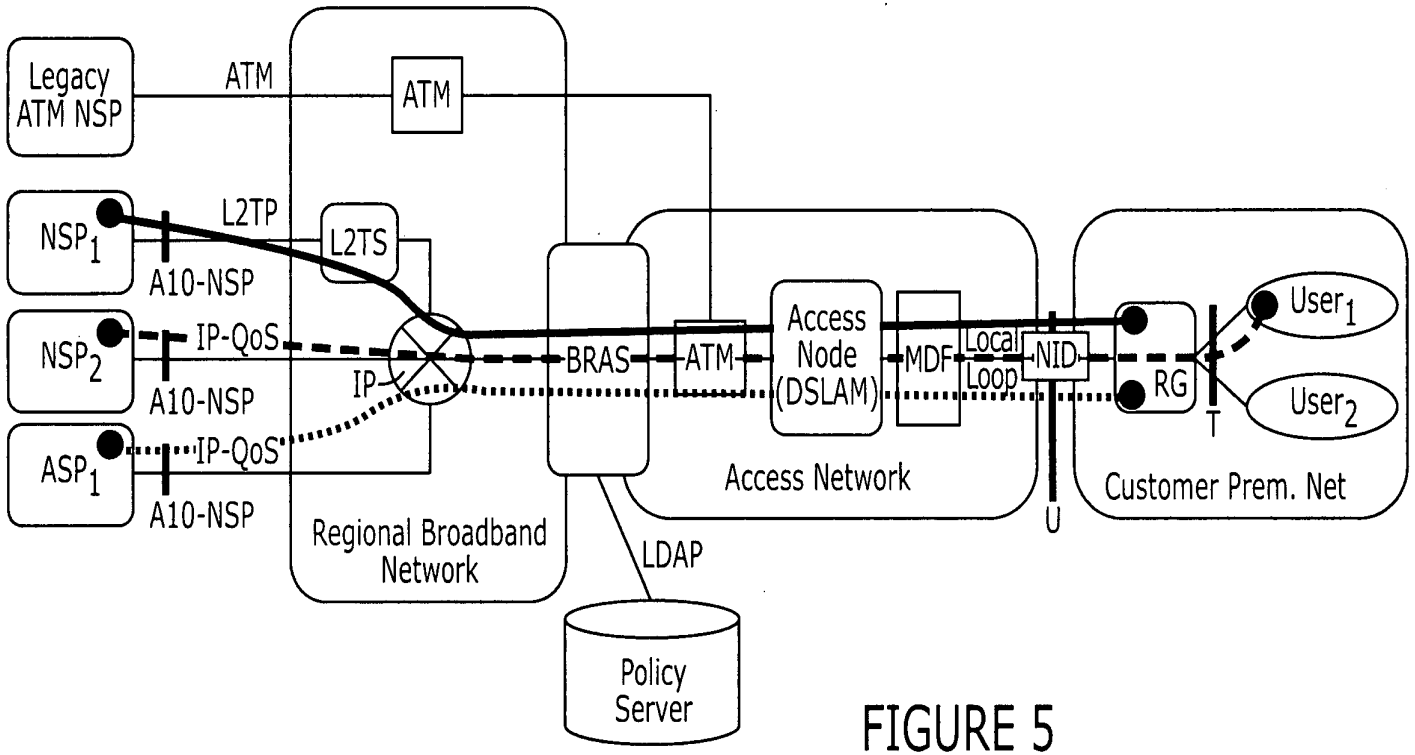

Legacy ATM NSP
ATM
ATM
NSP1
L2TP
L2TS
A10-NSP
NSP2
IP-QoS
IP
A10-NSP
ASP1
IP-QoS
A10-NSP
Regional Broadband Network
BRAS
ATM
Access Node (DSLAM)
MDF
Local Loop
NID
RG
User1
User2
T
U
Access Network
Customer Prem. Net
LDAP
Policy Server

FIGURE 5

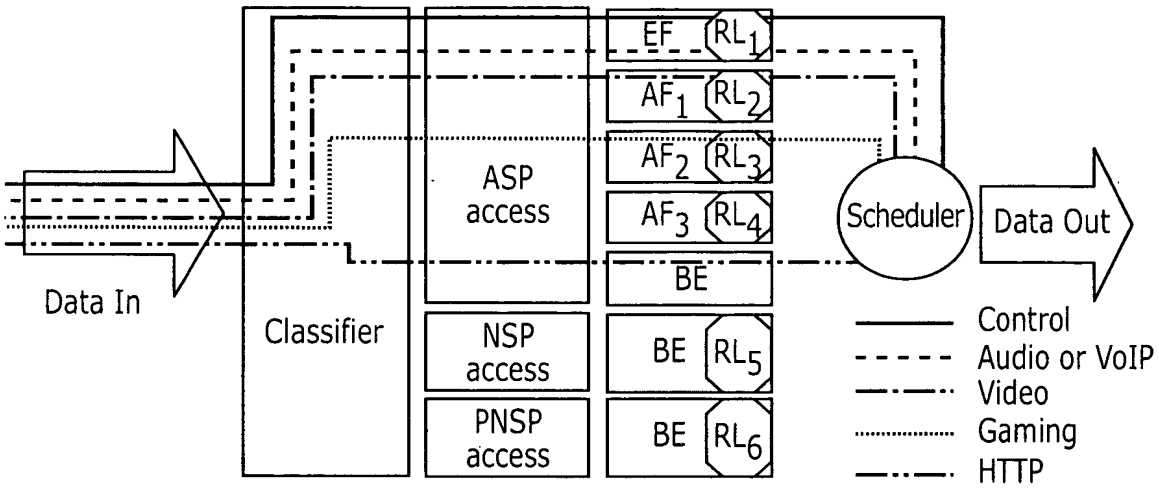


FIGURE 6

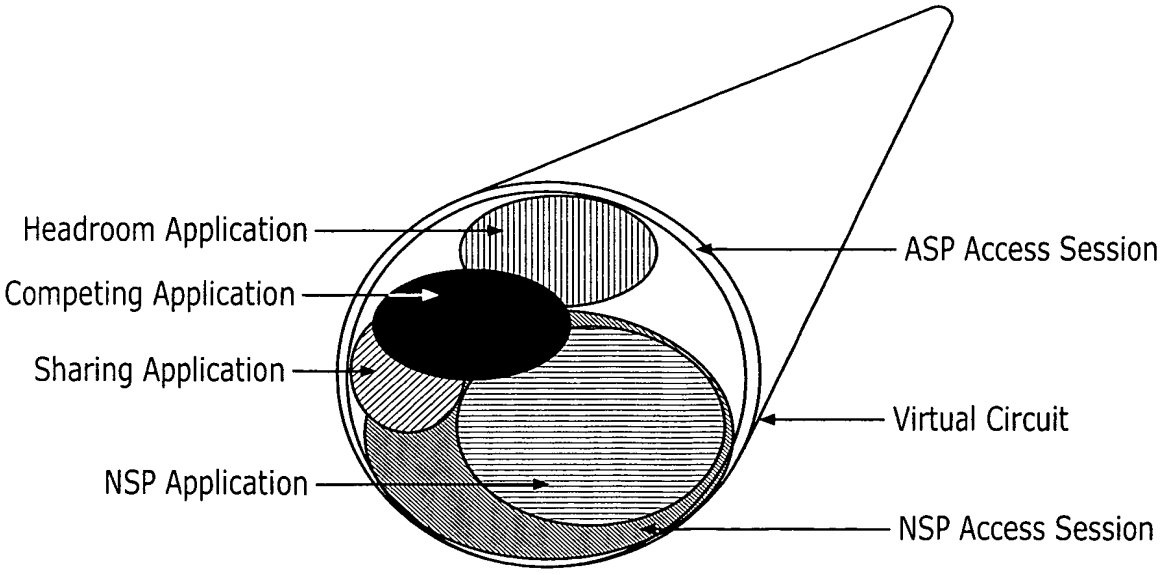
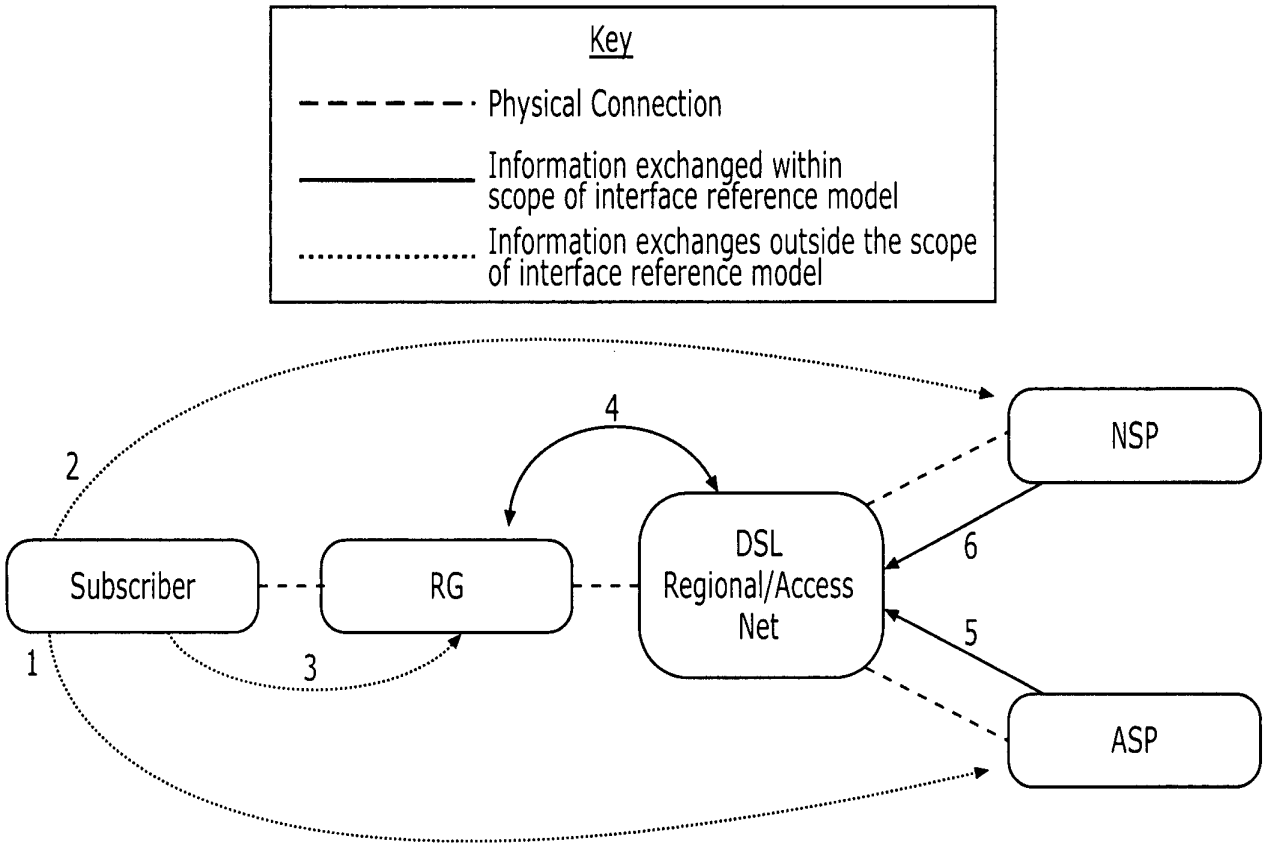


FIGURE 7



1,2: The subscriber exchanges information with the A/NSP when signing up for a service

3: The subscriber configures the RG. This may only be for the initial install. The ACS located within the Regional/Access Network may handle all subsequent conf changes

4: The RG initiates access sessions that are terminated in the DSL network. The ACS communicates with the RG for the configuration updates.

5,6: The NSP communicates with the DSL network to establish a DSL connection. The ASP and NSP also communicate bandwith and QoS changes per session or application.

FIGURE 8

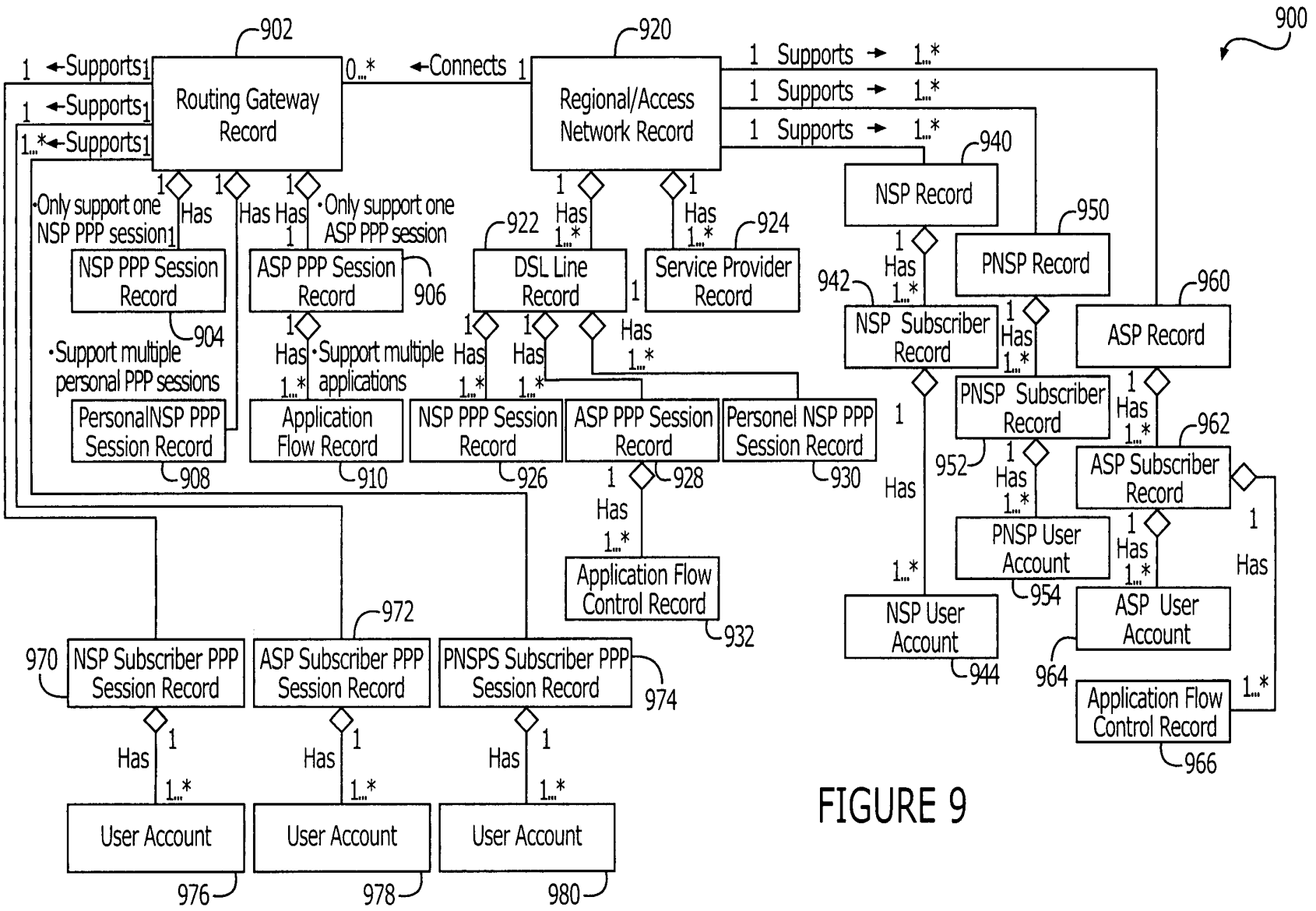

900
902
Routing Gateway Record
920
Regional/Access Network Record
Supports
Connects
0..*
1..*
NSP PPP Session Record
904
ASP PPP Session Record
906
DSL Line Record
922
Service Provider Record
924
NSP Record
940
PNSP Record
950
ASP Record
960
NSP Subscriber Record
942
PNSP Subscriber Record
952
ASP Subscriber Record
962
PNSP User Account
954
ASP User Account
964
NSP User Account
944
Application Flow Control Record
966
Personal NSP PPP Session Record
908
Application Flow Record
910
NSP PPP Session Record
926
ASP PPP Session Record
928
Personel NSP PPP Session Record
930
Application Flow Control Record
932
NSP Subscriber PPP Session Record
970
ASP Subscriber PPP Session Record
972
PNSPS Subscriber PPP Session Record
974
User Account
976
User Account
978
User Account
980
Has
Only support one NSP PPP session
Only support one ASP PPP session
Support multiple personal PPP sessions
Support multiple applications

FIGURE 9

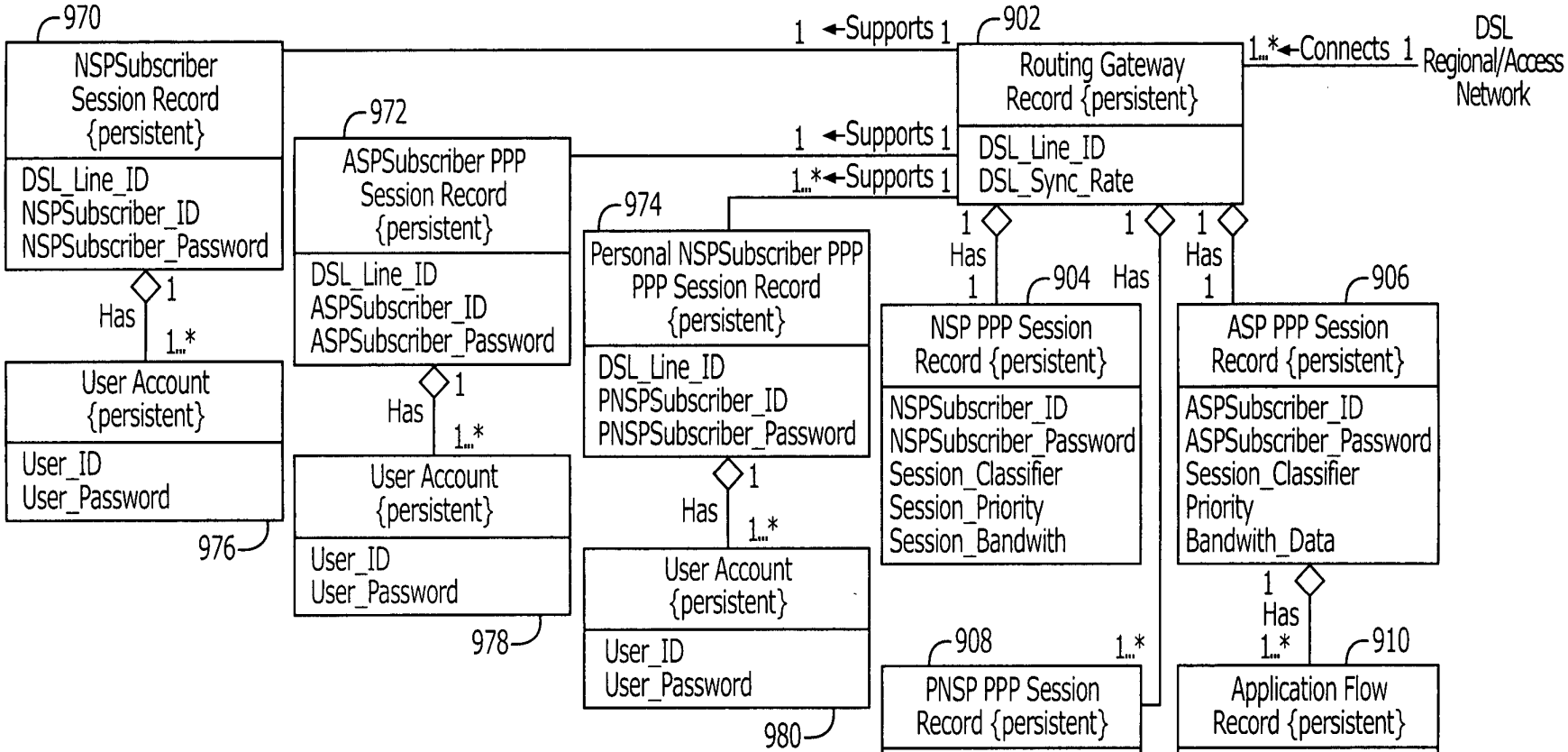

970
NSPSubscriber Session Record {persistent}
DSL_Line_ID
NSPSubscriber_ID
NSPSubscriber_Password
Has
1
1..*
User Account {persistent}
User_ID
User_Password
976
1 ←Supports 1
902
Routing Gateway Record {persistent}
DSL_Line_ID
DSL_Sync_Rate
1..*←Connects 1
DSL Regional/Access Network
972
ASPSubscriber PPP Session Record {persistent}
DSL_Line_ID
ASPSubscriber_ID
ASPSubscriber_Password
1 ←Supports 1
Has
1
1..*
User Account {persistent}
User_ID
User_Password
978
1..*←Supports 1
974
Personal NSPSubscriber PPP PPP Session Record {persistent}
DSL_Line_ID
PNSPSubscriber_ID
PNSPSubscriber_Password
Has
1
1..*
User Account {persistent}
User_ID
User_Password
980
1
Has
1
904
NSP PPP Session Record {persistent}
NSPSubscriber_ID
NSPSubscriber_Password
Session_Classifier
Session_Priority
Session_Bandwith
1
Has
1
906
ASP PPP Session Record {persistent}
ASPSubscriber_ID
ASPSubscriber_Password
Session_Classifier
Priority
Bandwith_Data
1
Has
1..*
910
Application Flow Record {persistent}
Flow_Classifier
Flow_Priority
Flow_Bandwith
908
PNSP PPP Session Record {persistent}
Session_Classifier
Session_Priority
Session_Bandwith
1..*

FIGURE 10

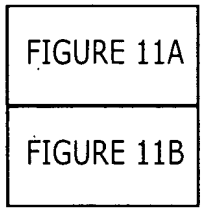


FIGURE 11

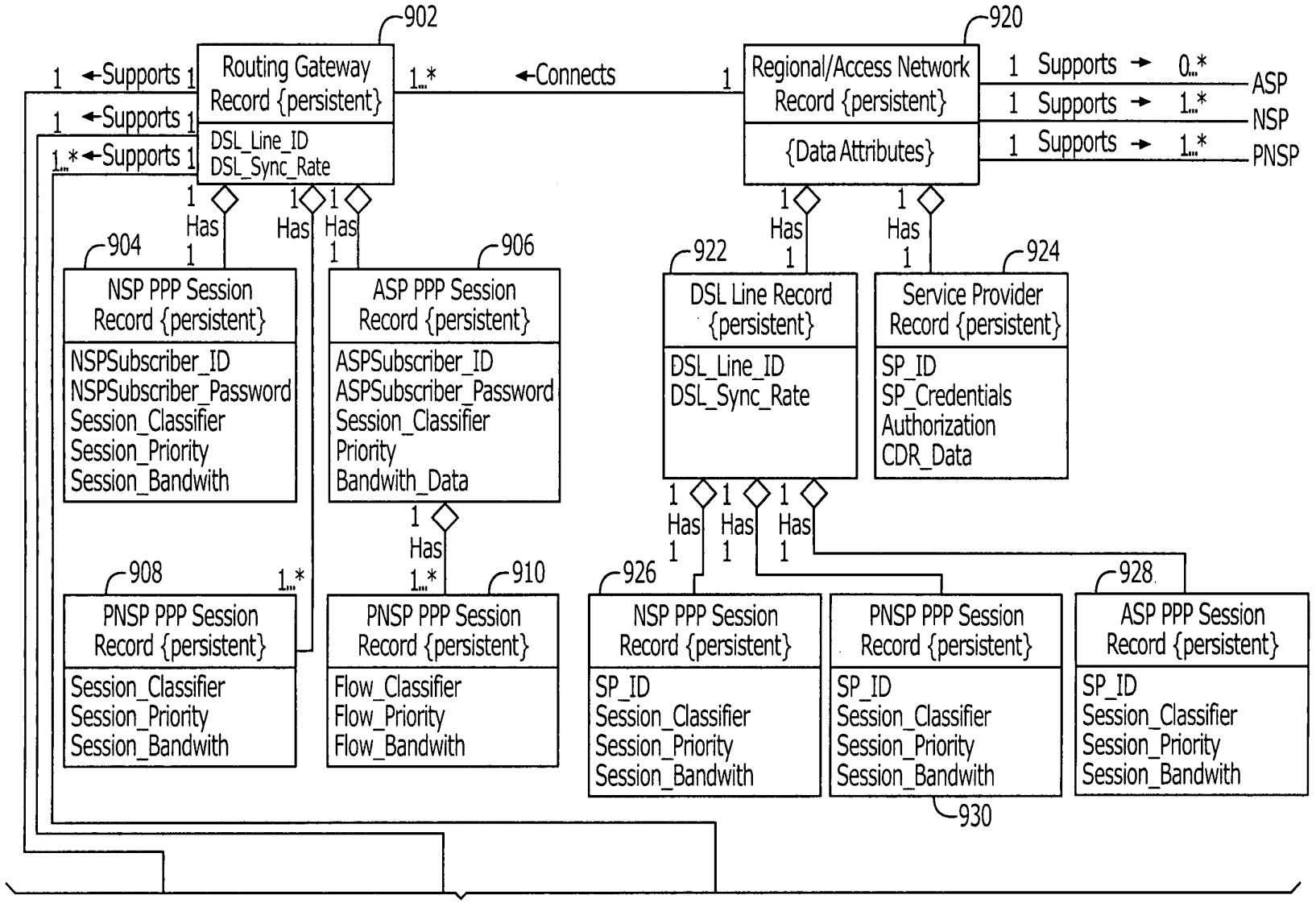


FIGURE 11B

FIGURE 11A

FIGURE 11A

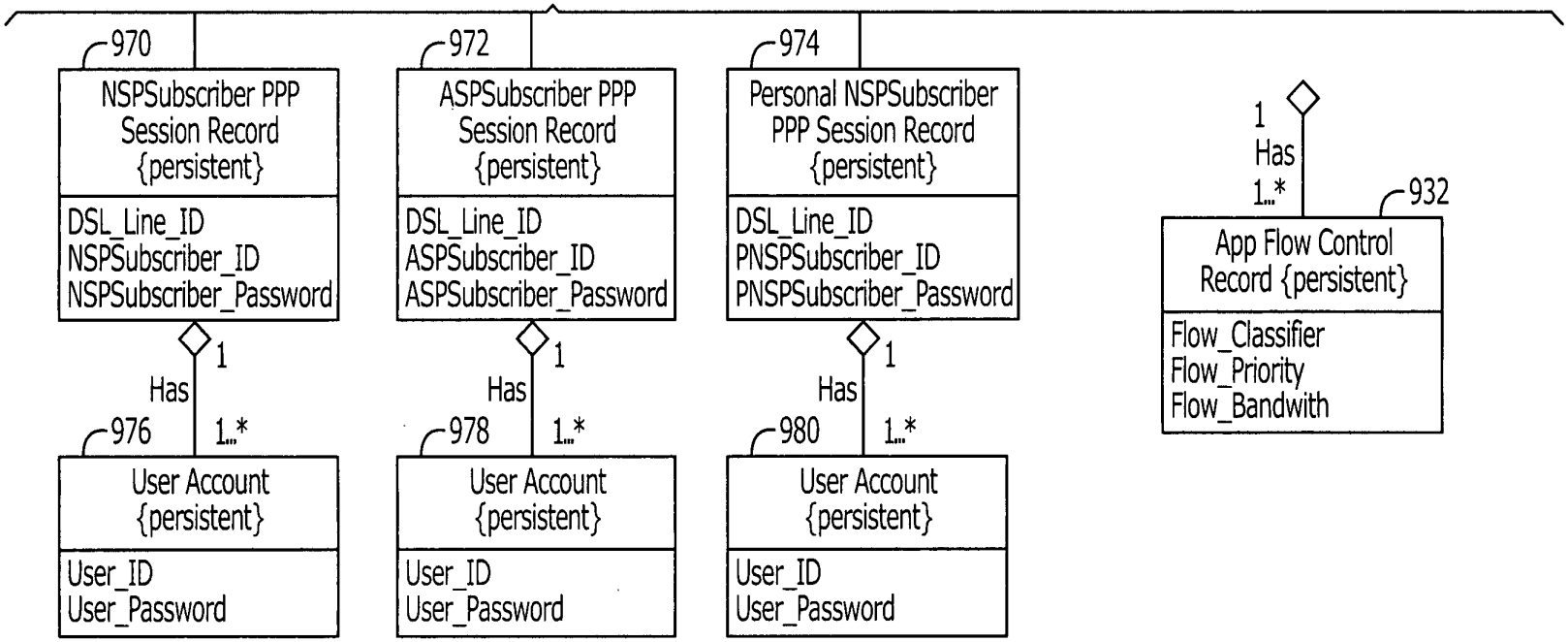


FIGURE 11B

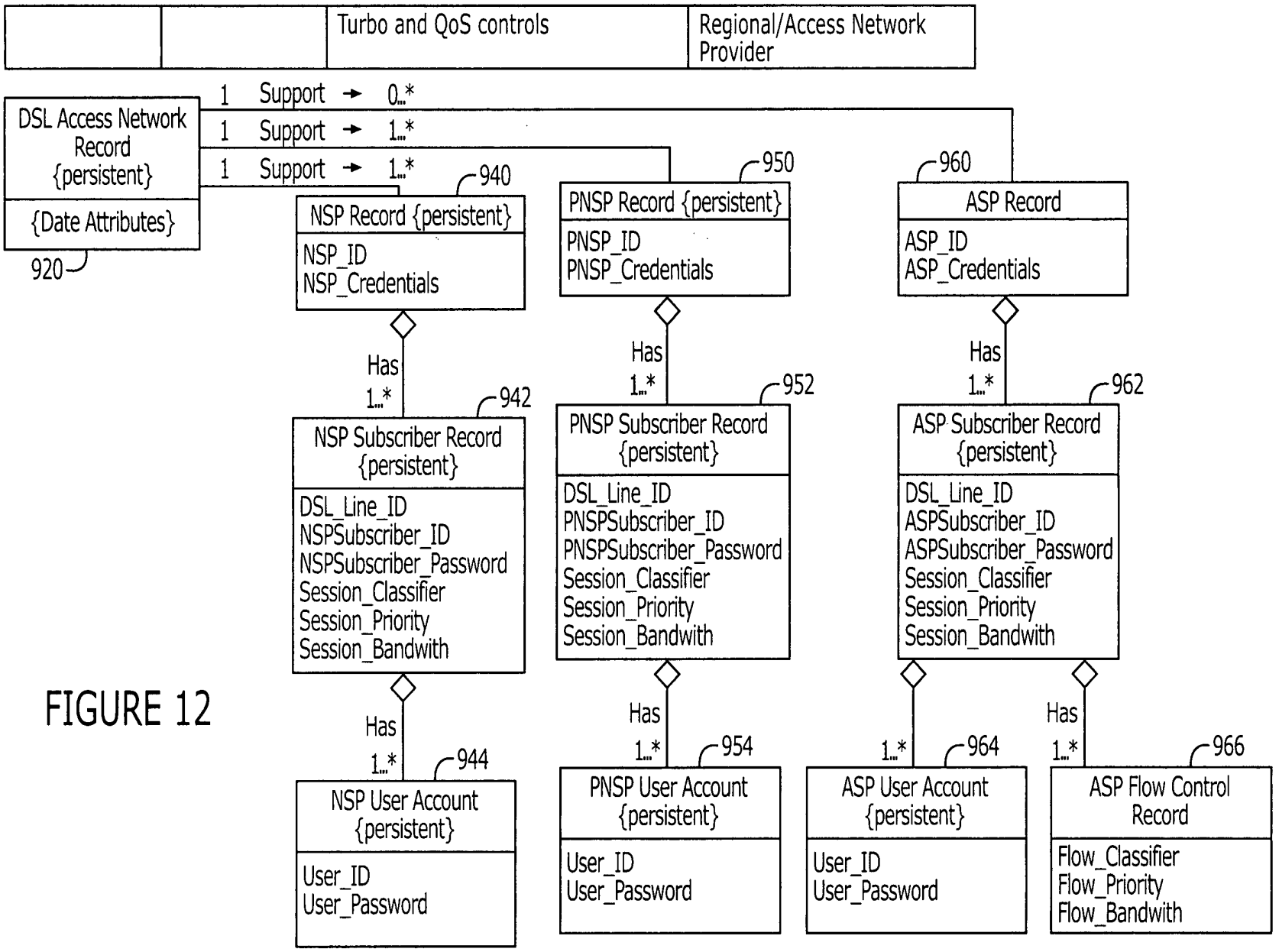

Turbo and QoS controls
Regional/Access Network Provider
DSL Access Network Record {persistent}
{Date Attributes}
920
1 Support → 0..*
1 Support → 1..*
1 Support → 1..*
NSP Record {persistent}
NSP_ID
NSP_Credentials
940
Has 1..*
NSP Subscriber Record {persistent}
DSL_Line_ID
NSPSubscriber_ID
NSPSubscriber_Password
Session_Classifier
Session_Priority
Session_Bandwith
942
Has 1..*
NSP User Account {persistent}
User_ID
User_Password
944
PNSP Record {persistent}
PNSP_ID
PNSP_Credentials
950
Has 1..*
PNSP Subscriber Record {persistent}
DSL_Line_ID
PNSPSubscriber_ID
PNSPSubscriber_Password
Session_Classifier
Session_Priority
Session_Bandwith
952
Has 1..*
PNSP User Account {persistent}
User_ID
User_Password
954
ASP Record
ASP_ID
ASP_Credentials
960
Has 1..*
ASP Subscriber Record {persistent}
DSL_Line_ID
ASPSubscriber_ID
ASPSubscriber_Password
Session_Classifier
Session_Priority
Session_Bandwith
962
1..*
ASP User Account {persistent}
User_ID
User_Password
964
Has 1..*
ASP Flow Control Record
Flow_Classifier
Flow_Priority
Flow_Bandwith
966

FIGURE 12

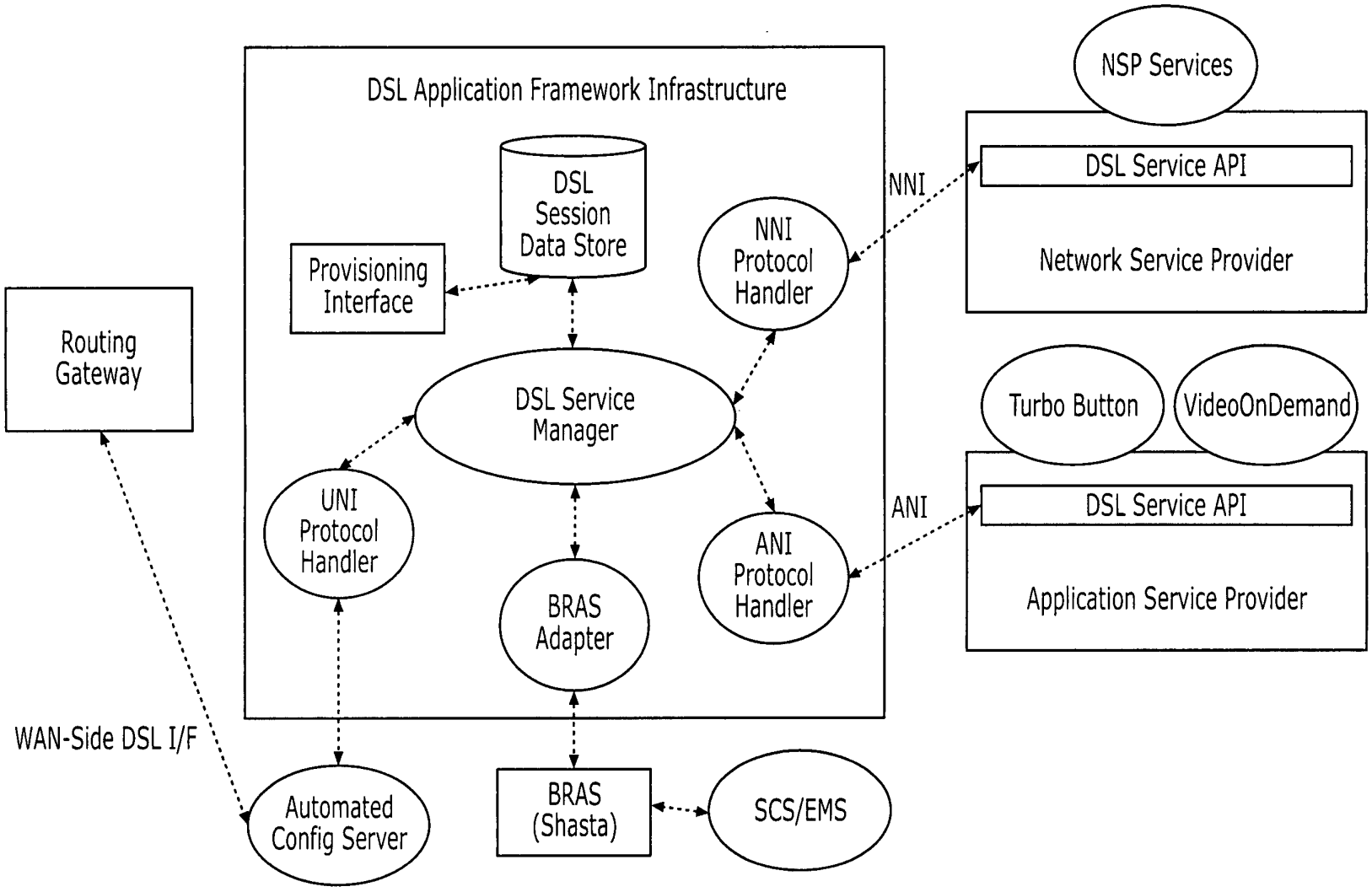

DSL Application Framework Infrastructure
DSL Session Data Store
Provisioning Interface
NNI Protocol Handler
DSL Service Manager
UNI Protocol Handler
BRAS Adapter
ANI Protocol Handler
Routing Gateway
WAN-Side DSL I/F
Automated Config Server
BRAS (Shasta)
SCS/EMS
NNI
ANI
NSP Services
DSL Service API
Network Service Provider
Turbo Button
VideoOnDemand
DSL Service API
Application Service Provider

FIGURE 13

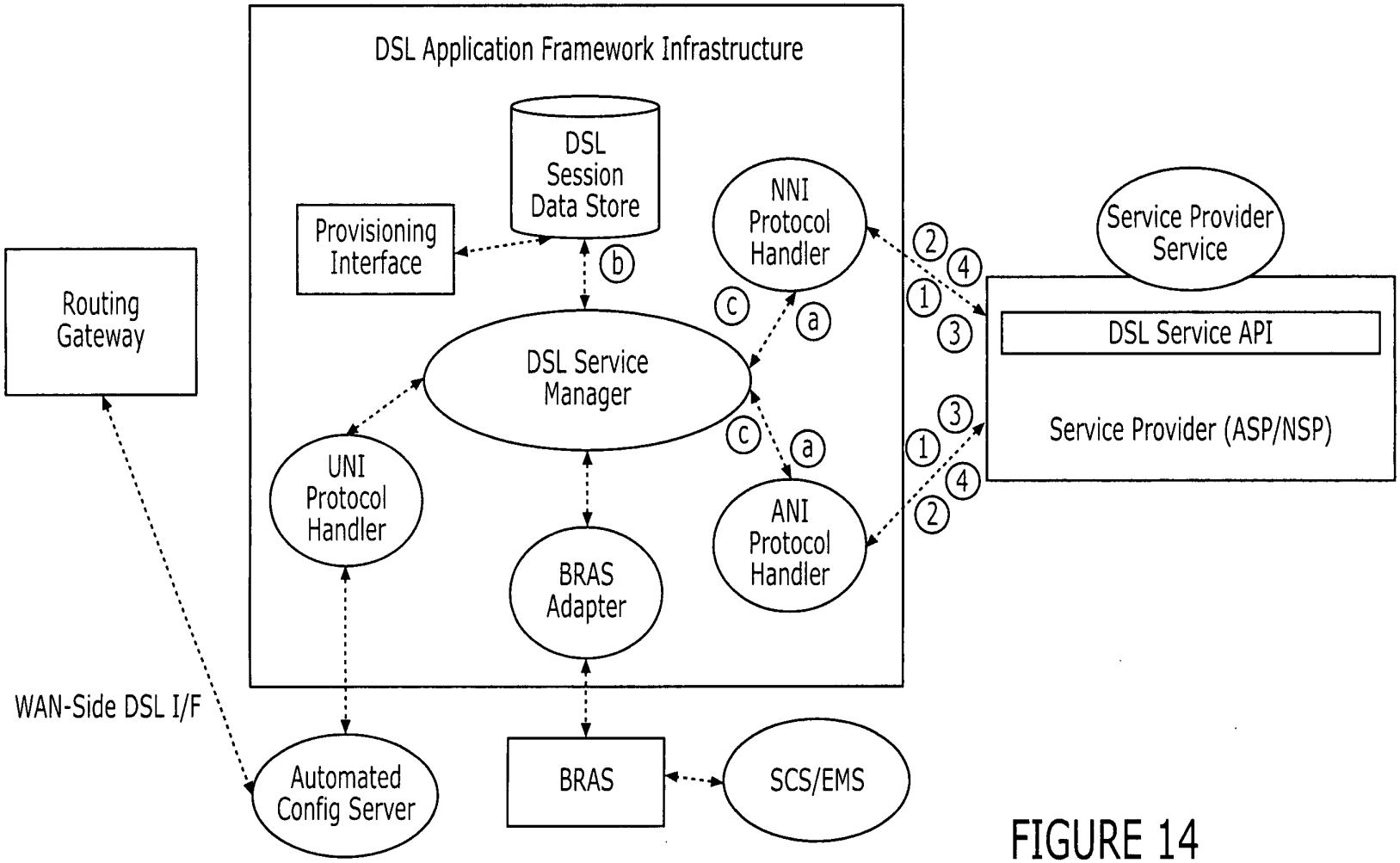

DSL Application Framework Infrastructure
DSL Session Data Store
Provisioning Interface
NNI Protocol Handler
Service Provider Service
Routing Gateway
DSL Service API
DSL Service Manager
Service Provider (ASP/NSP)
UNI Protocol Handler
ANI Protocol Handler
BRAS Adapter
WAN-Side DSL I/F
Automated Config Server
BRAS
SCS/EMS
a
b
c
1
2
3
4

FIGURE 14

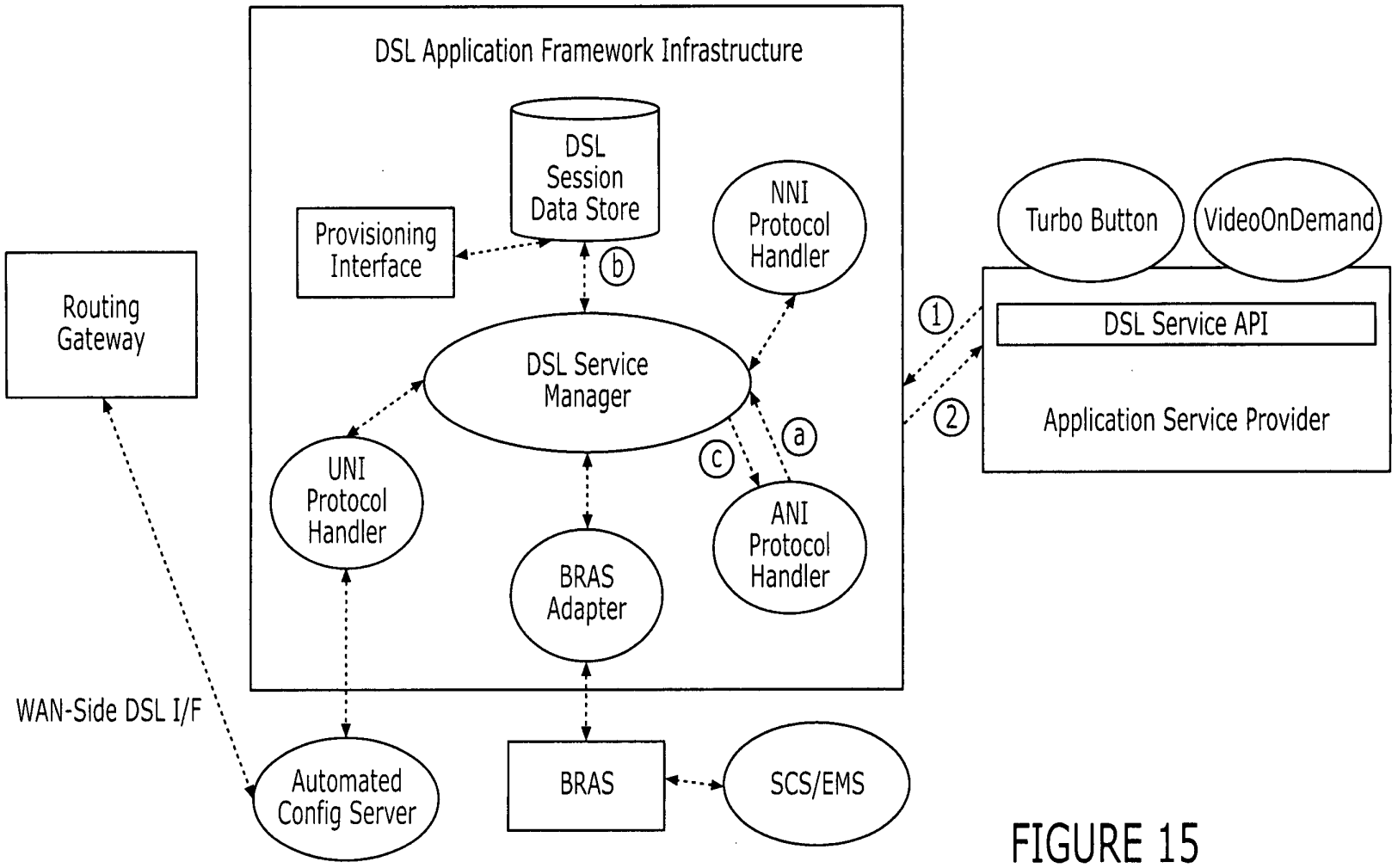

DSL Application Framework Infrastructure
DSL Session Data Store
Provisioning Interface
NNI Protocol Handler
Routing Gateway
DSL Service Manager
UNI Protocol Handler
BRAS Adapter
ANI Protocol Handler
WAN-Side DSL I/F
Automated Config Server
BRAS
SCS/EMS
Turbo Button
VideoOnDemand
DSL Service API
Application Service Provider
a
b
c
1
2

FIGURE 15

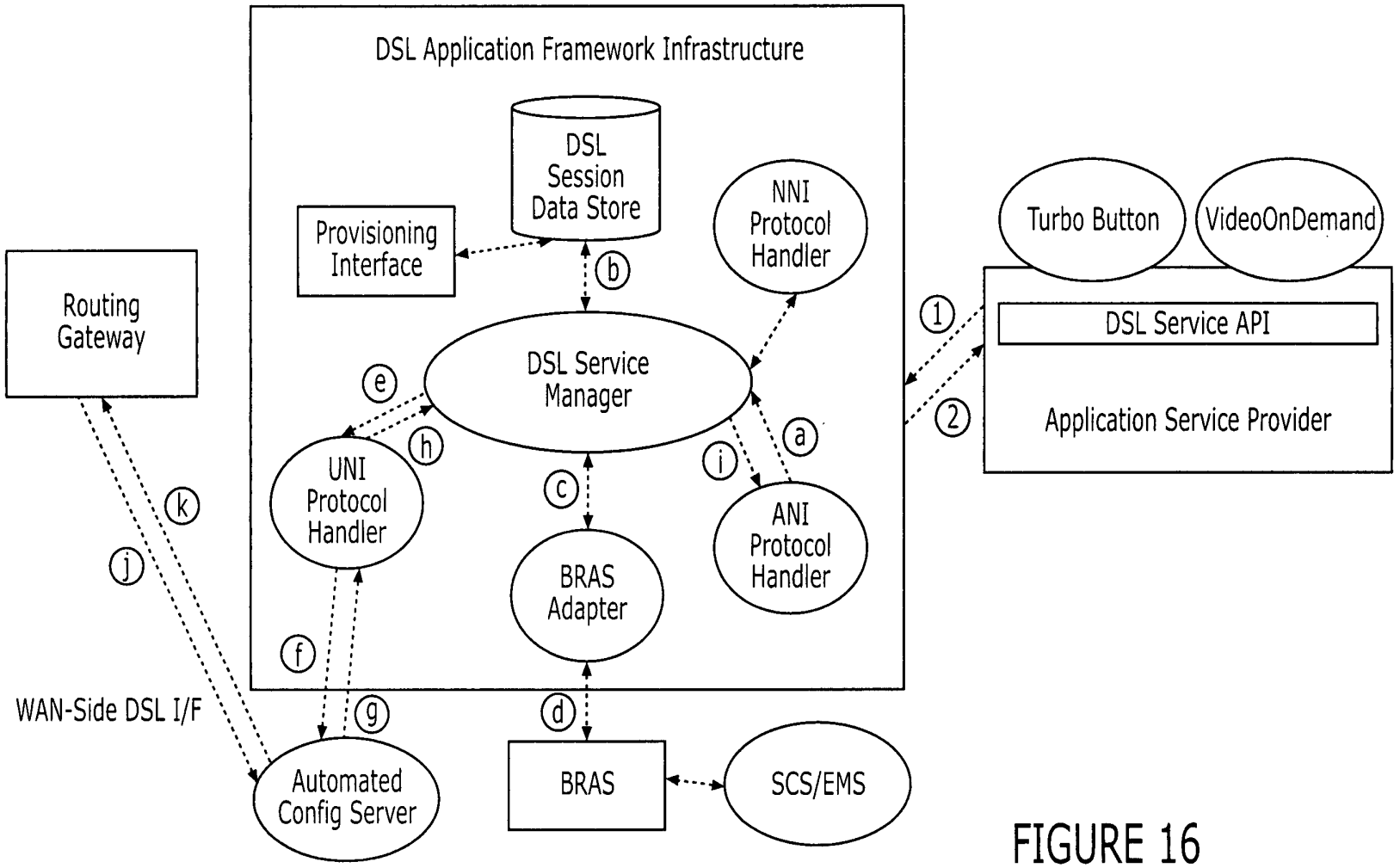

DSL Application Framework Infrastructure
DSL Session Data Store
Provisioning Interface
NNI Protocol Handler
Routing Gateway
DSL Service Manager
Turbo Button
VideoOnDemand
DSL Service API
Application Service Provider
UNI Protocol Handler
BRAS Adapter
ANI Protocol Handler
WAN-Side DSL I/F
Automated Config Server
BRAS
SCS/EMS
a
b
c
d
e
f
g
h
i
j
k
1
2

FIGURE 16

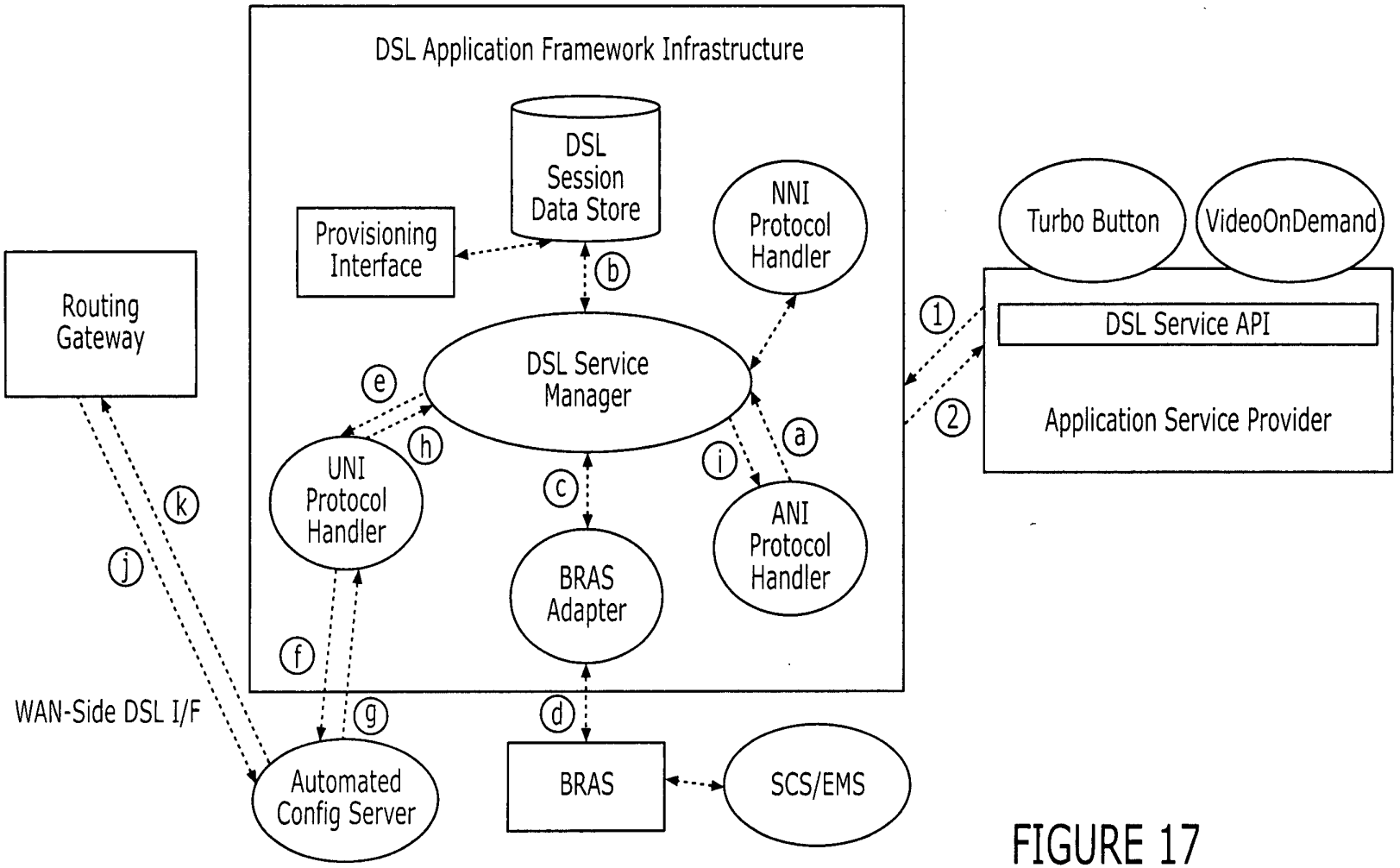

DSL Application Framework Infrastructure
DSL Session Data Store
Provisioning Interface
NNI Protocol Handler
Routing Gateway
DSL Service Manager
UNI Protocol Handler
BRAS Adapter
ANI Protocol Handler
WAN-Side DSL I/F
Automated Config Server
BRAS
SCS/EMS
Turbo Button
VideoOnDemand
DSL Service API
Application Service Provider
a
b
c
d
e
f
g
h
i
j
k
1
2

FIGURE 17

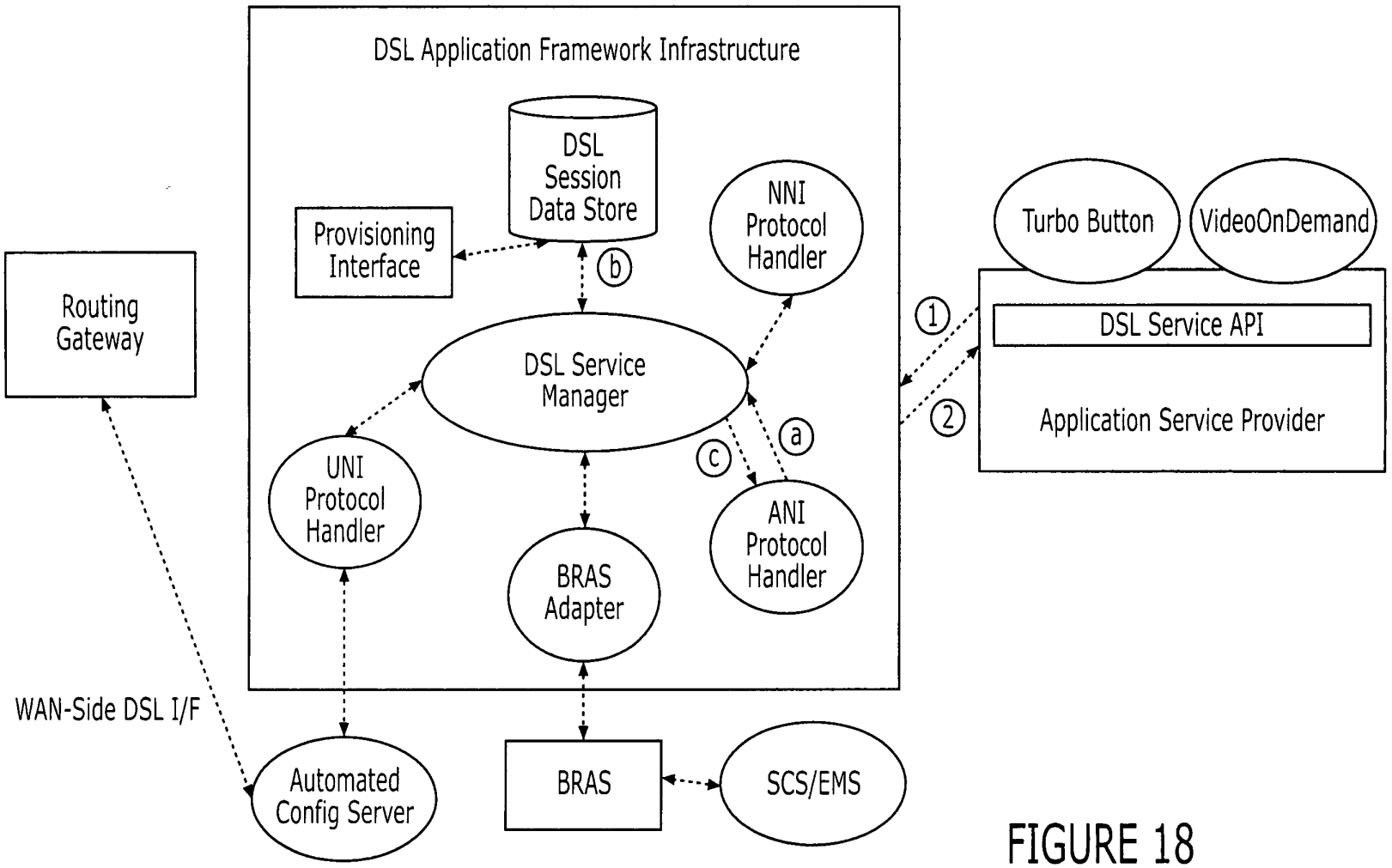

DSL Application Framework Infrastructure
DSL Session Data Store
Provisioning Interface
NNI Protocol Handler
Routing Gateway
DSL Service Manager
UNI Protocol Handler
BRAS Adapter
ANI Protocol Handler
WAN-Side DSL I/F
Automated Config Server
BRAS
SCS/EMS
Turbo Button
VideoOnDemand
DSL Service API
Application Service Provider
a
b
c
1
2

FIGURE 18

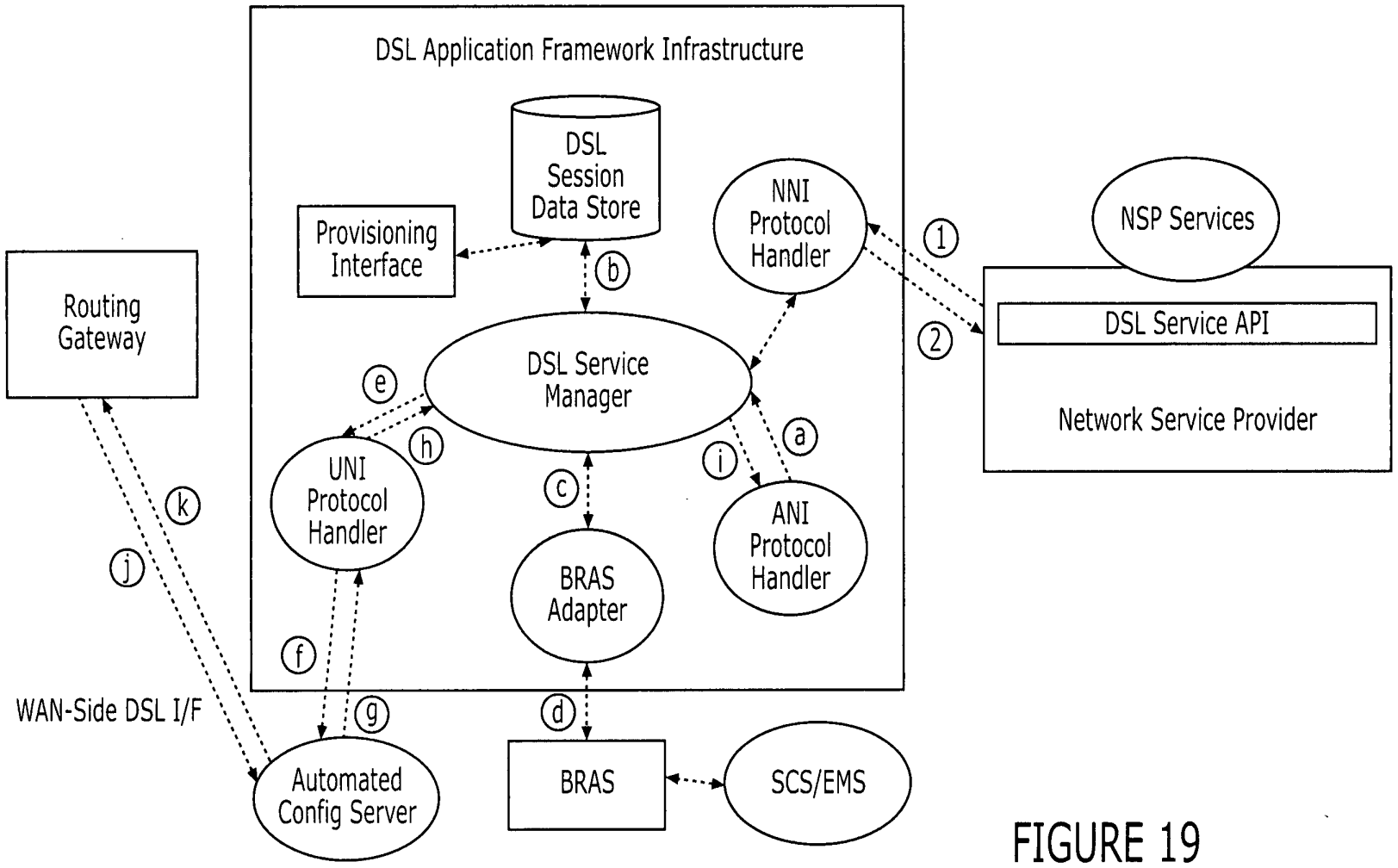

DSL Application Framework Infrastructure
DSL Session Data Store
Provisioning Interface
NNI Protocol Handler
NSP Services
Routing Gateway
DSL Service API
DSL Service Manager
Network Service Provider
UNI Protocol Handler
ANI Protocol Handler
BRAS Adapter
WAN-Side DSL I/F
Automated Config Server
BRAS
SCS/EMS
a
b
c
d
e
f
g
h
i
j
k
1
2

FIGURE 19

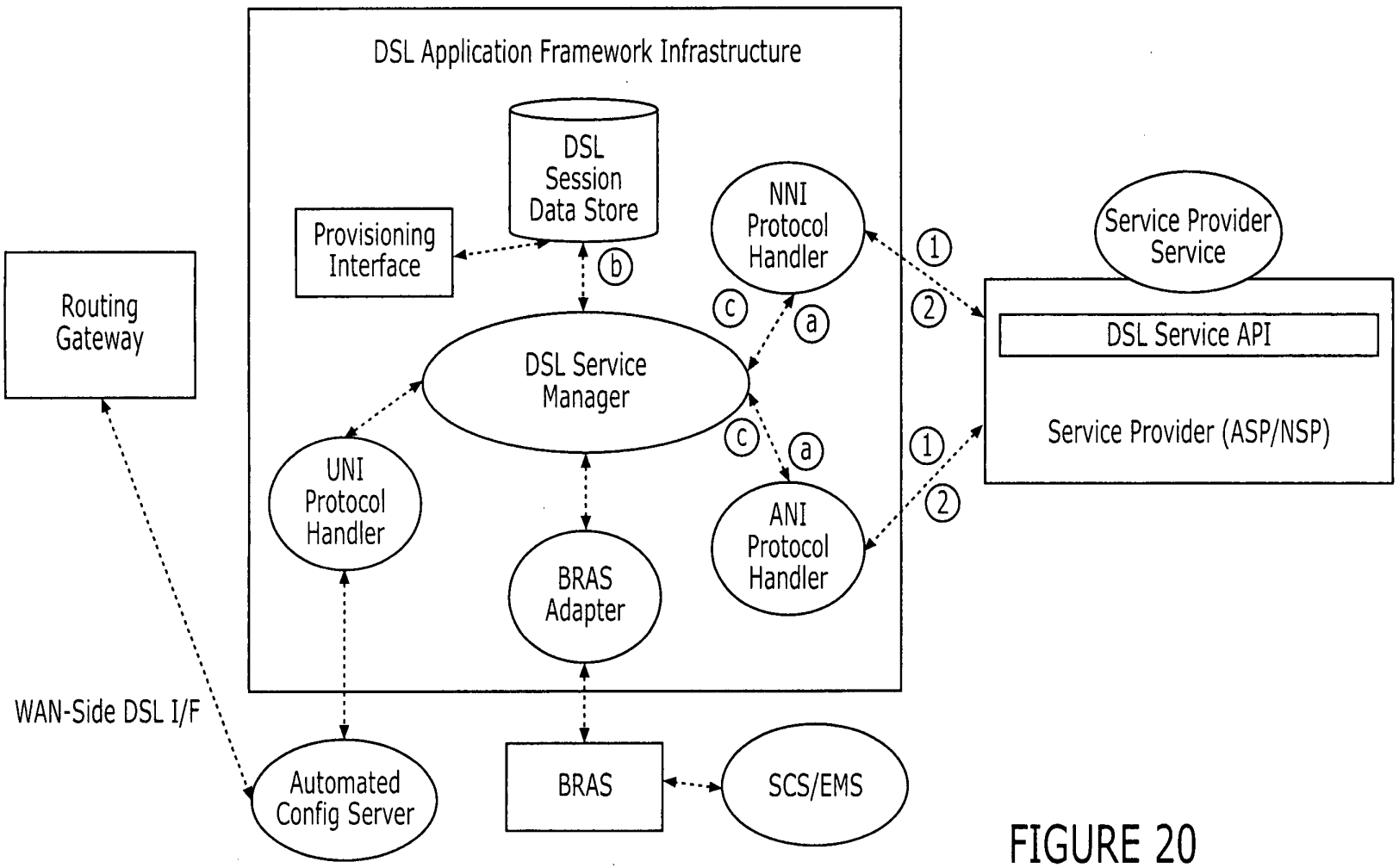

DSL Application Framework Infrastructure
DSL Session Data Store
Provisioning Interface
NNI Protocol Handler
Service Provider Service
Routing Gateway
DSL Service API
DSL Service Manager
Service Provider (ASP/NSP)
UNI Protocol Handler
ANI Protocol Handler
BRAS Adapter
WAN-Side DSL I/F
Automated Config Server
BRAS
SCS/EMS
a
b
c
1
2

FIGURE 20

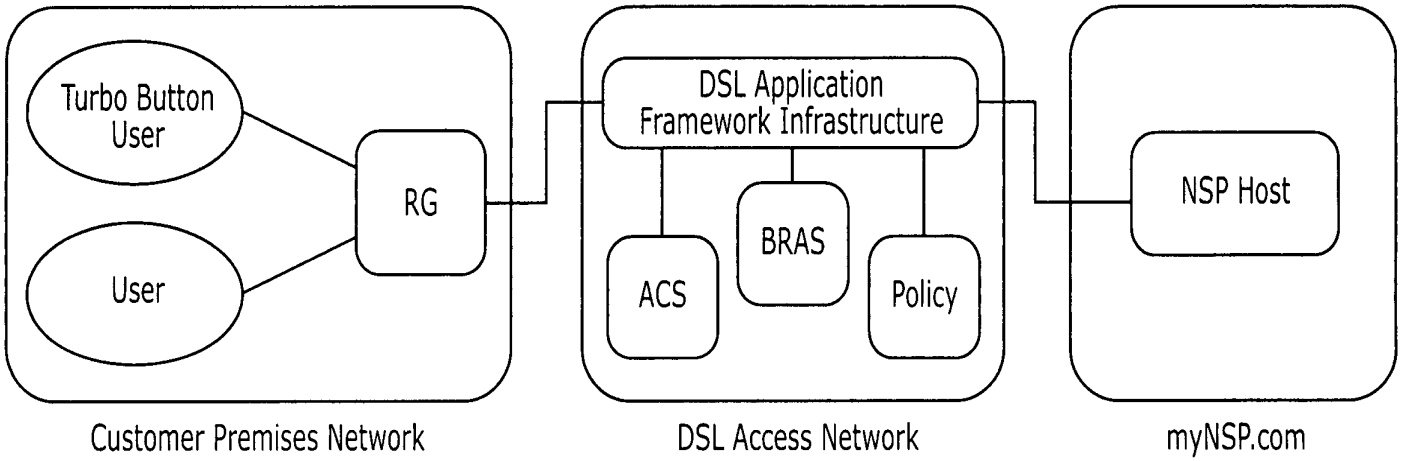


FIGURE 21

FIGURE 22A

FIGURE 22B

FIGURE 22

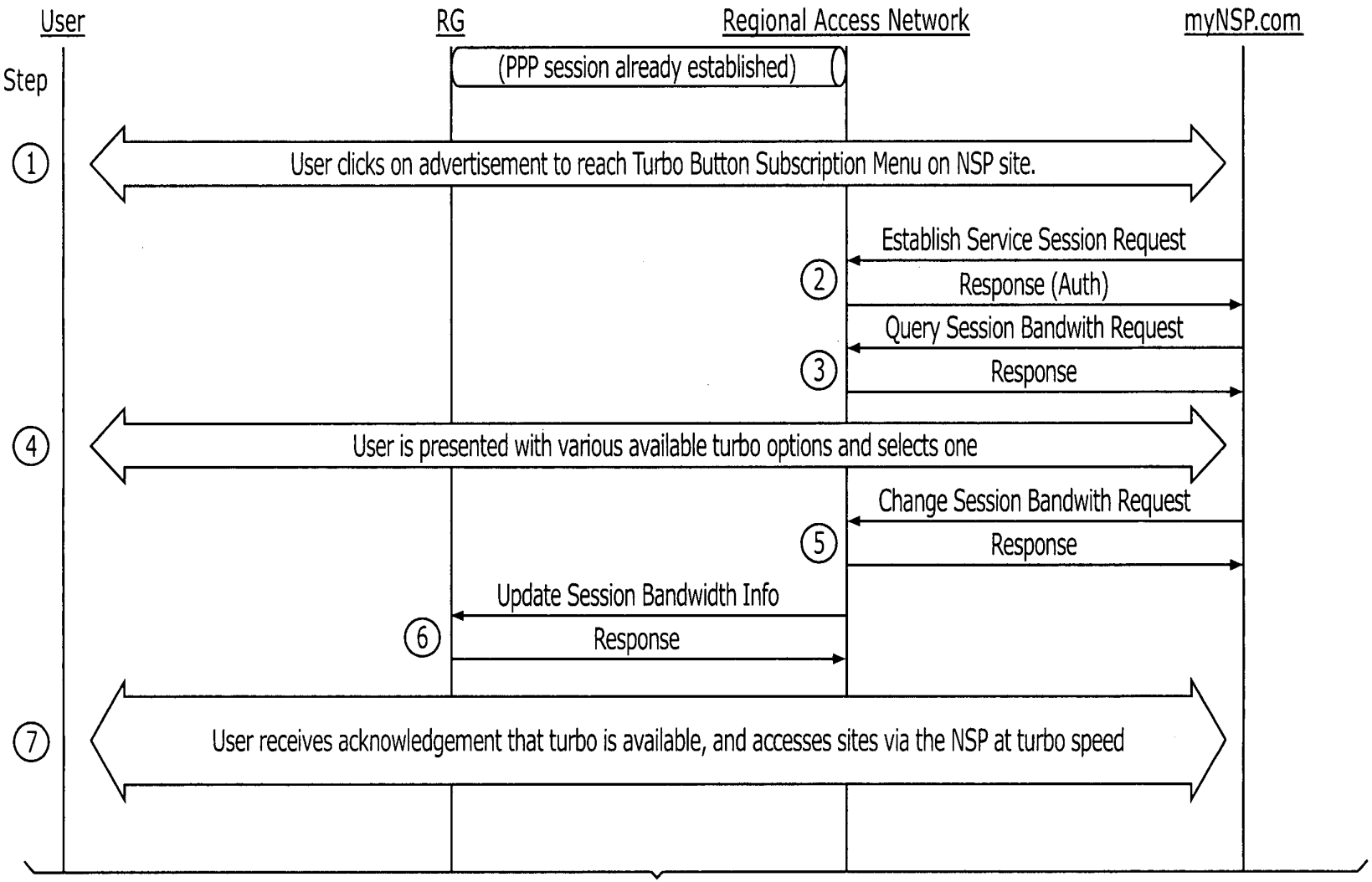


FIGURE 22B

FIGURE 22A

FIGURE 22A

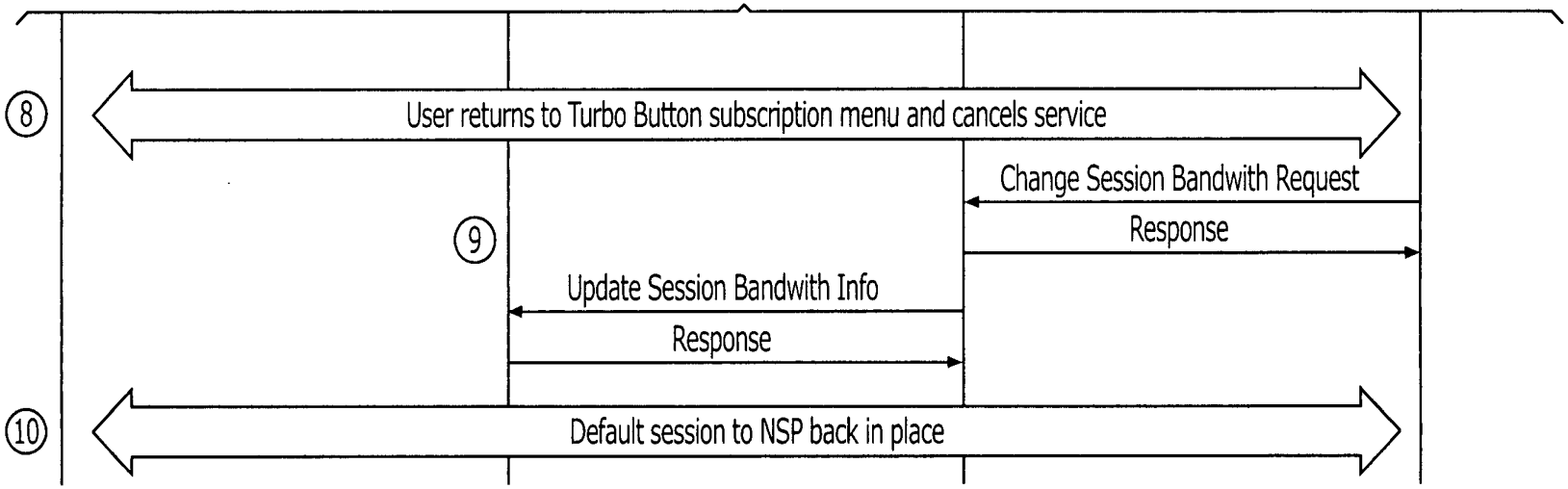


FIGURE 22B

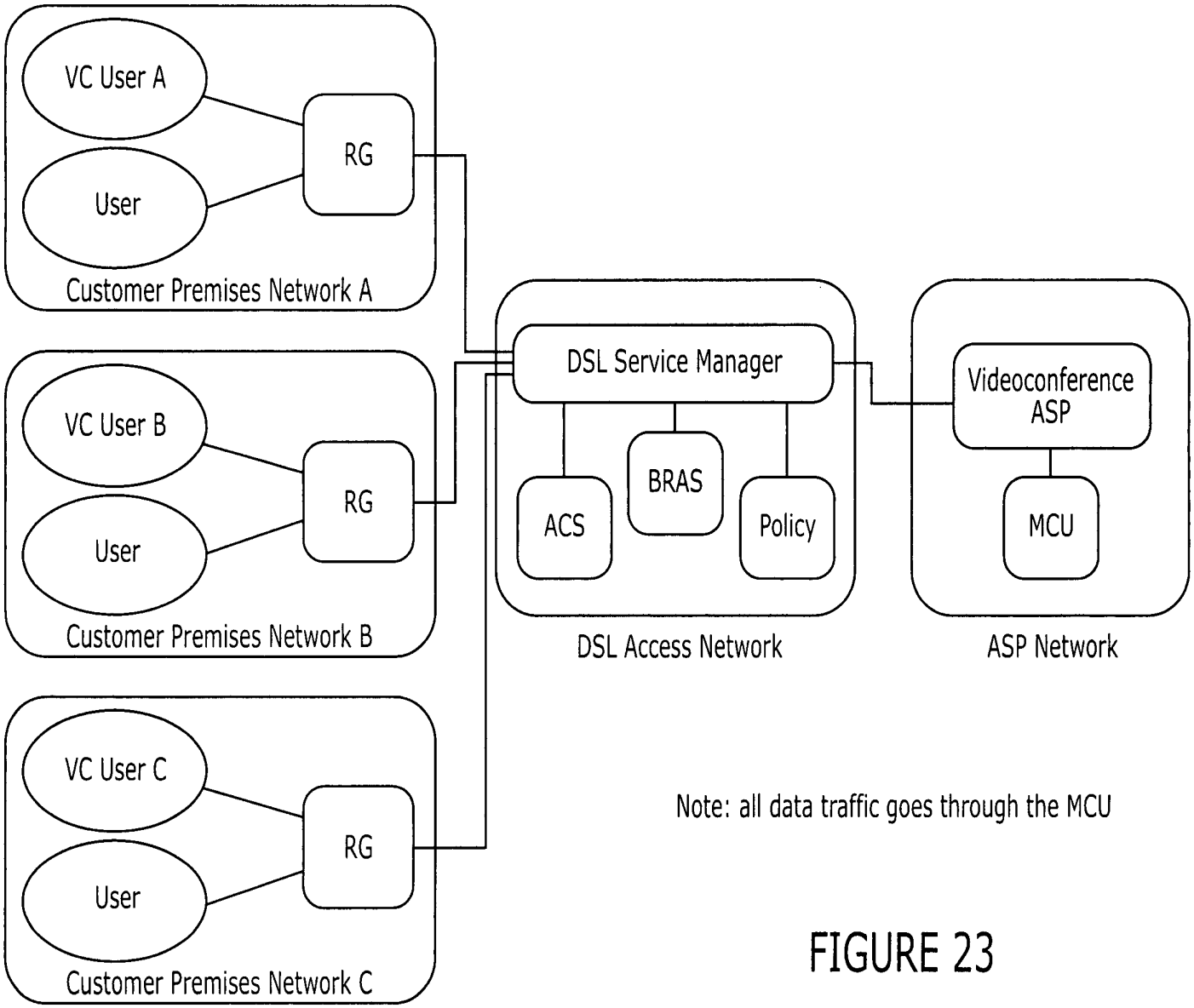

VC User A
User
RG
Customer Premises Network A
VC User B
User
RG
Customer Premises Network B
VC User C
User
RG
Customer Premises Network C
DSL Service Manager
ACS
BRAS
Policy
DSL Access Network
Videoconference ASP
MCU
ASP Network
Note: all data traffic goes through the MCU

FIGURE 23

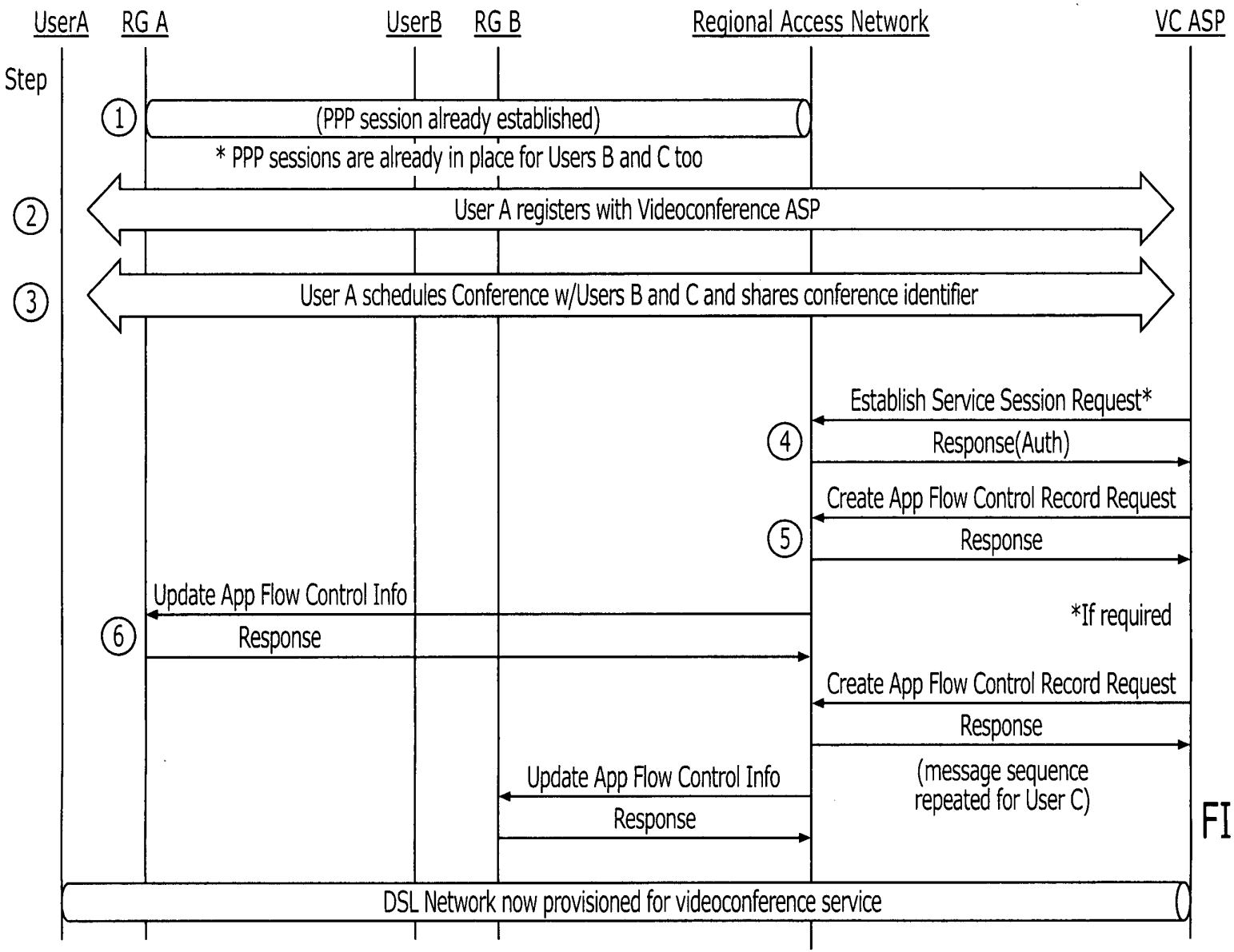

UserA
RG A
UserB
RG B
Regional Access Network
VC ASP
Step
1
(PPP session already established)
* PPP sessions are already in place for Users B and C too
2
User A registers with Videoconference ASP
3
User A schedules Conference w/Users B and C and shares conference identifier
Establish Service Session Request*
4
Response(Auth)
Create App Flow Control Record Request
5
Response
Update App Flow Control Info
*If required
6
Response
Create App Flow Control Record Request
Response
(message sequence repeated for User C)
Update App Flow Control Info
Response
DSL Network now provisioned for videoconference service

FIGURE 24

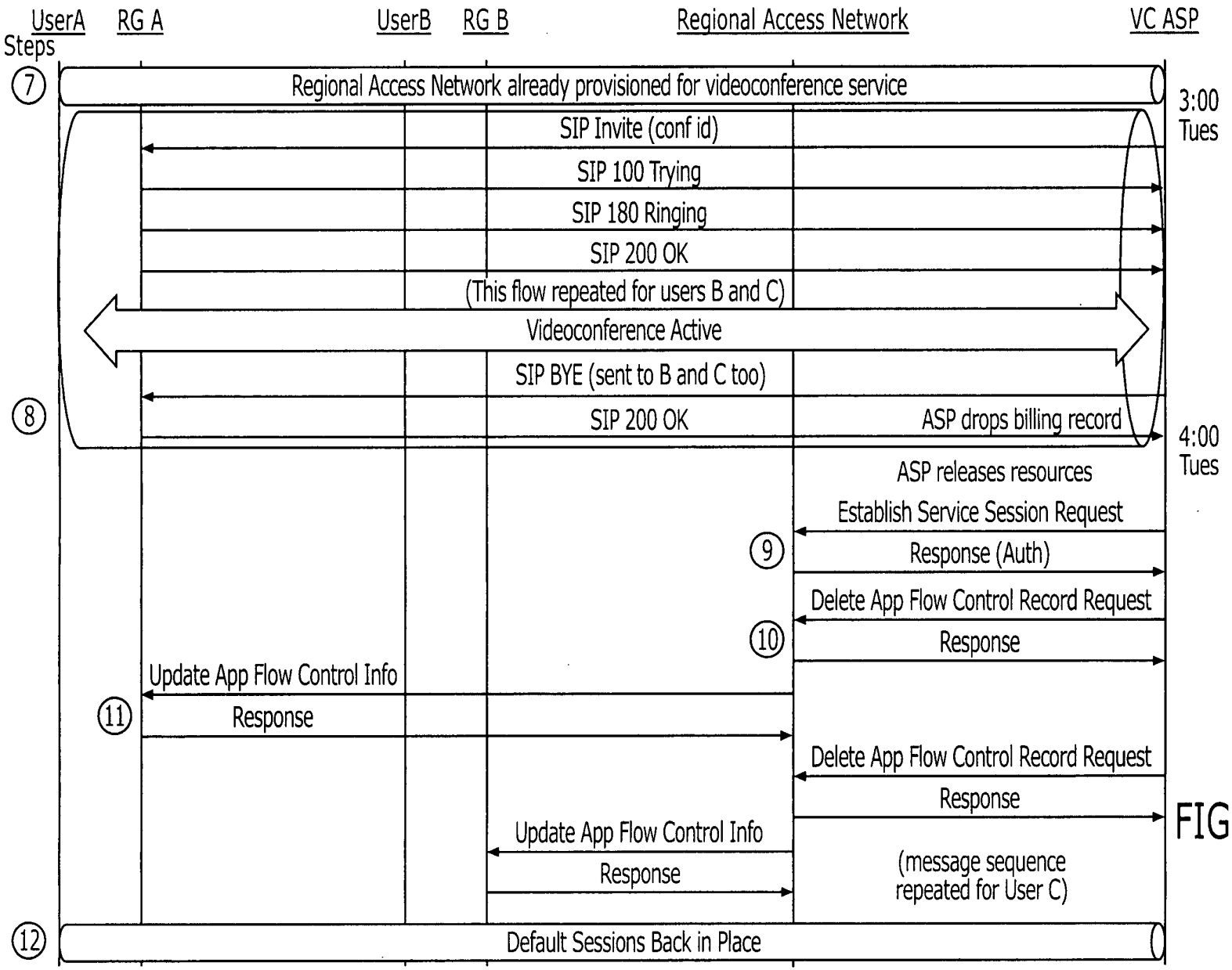

UserA
RG A
UserB
RG B
Regional Access Network
VC ASP
Steps
7
Regional Access Network already provisioned for videoconference service
3:00 Tues
SIP Invite (conf id)
SIP 100 Trying
SIP 180 Ringing
SIP 200 OK
(This flow repeated for users B and C)
Videoconference Active
SIP BYE (sent to B and C too)
8
SIP 200 OK
ASP drops billing record
4:00 Tues
ASP releases resources
Establish Service Session Request
9
Response (Auth)
Delete App Flow Control Record Request
10
Response
Update App Flow Control Info
11
Response
Delete App Flow Control Record Request
Response
Update App Flow Control Info
Response
(message sequence repeated for User C)
12
Default Sessions Back in Place

FIGURE 25

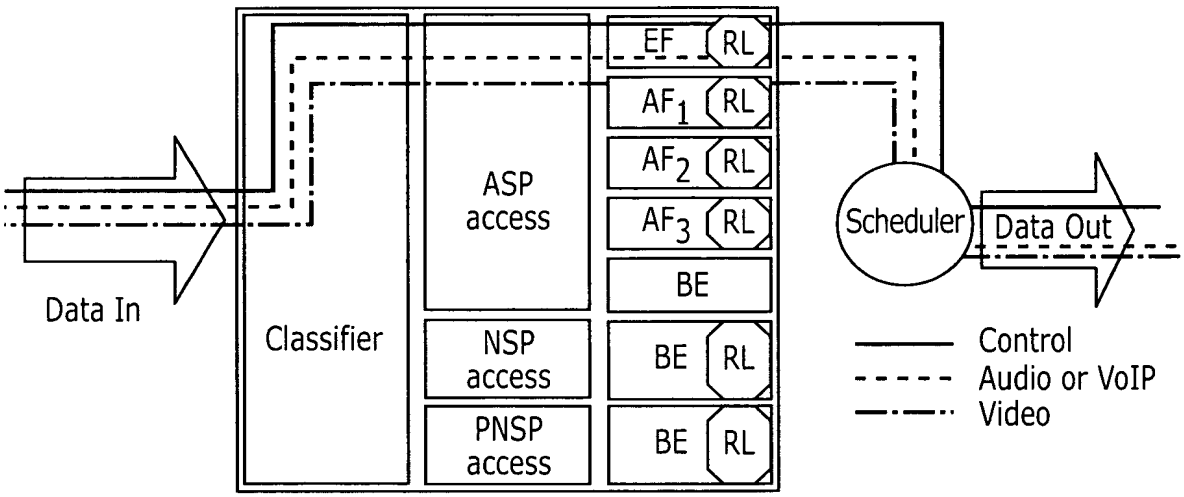


FIGURE 26

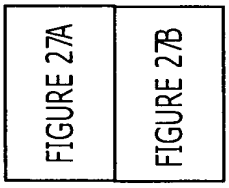
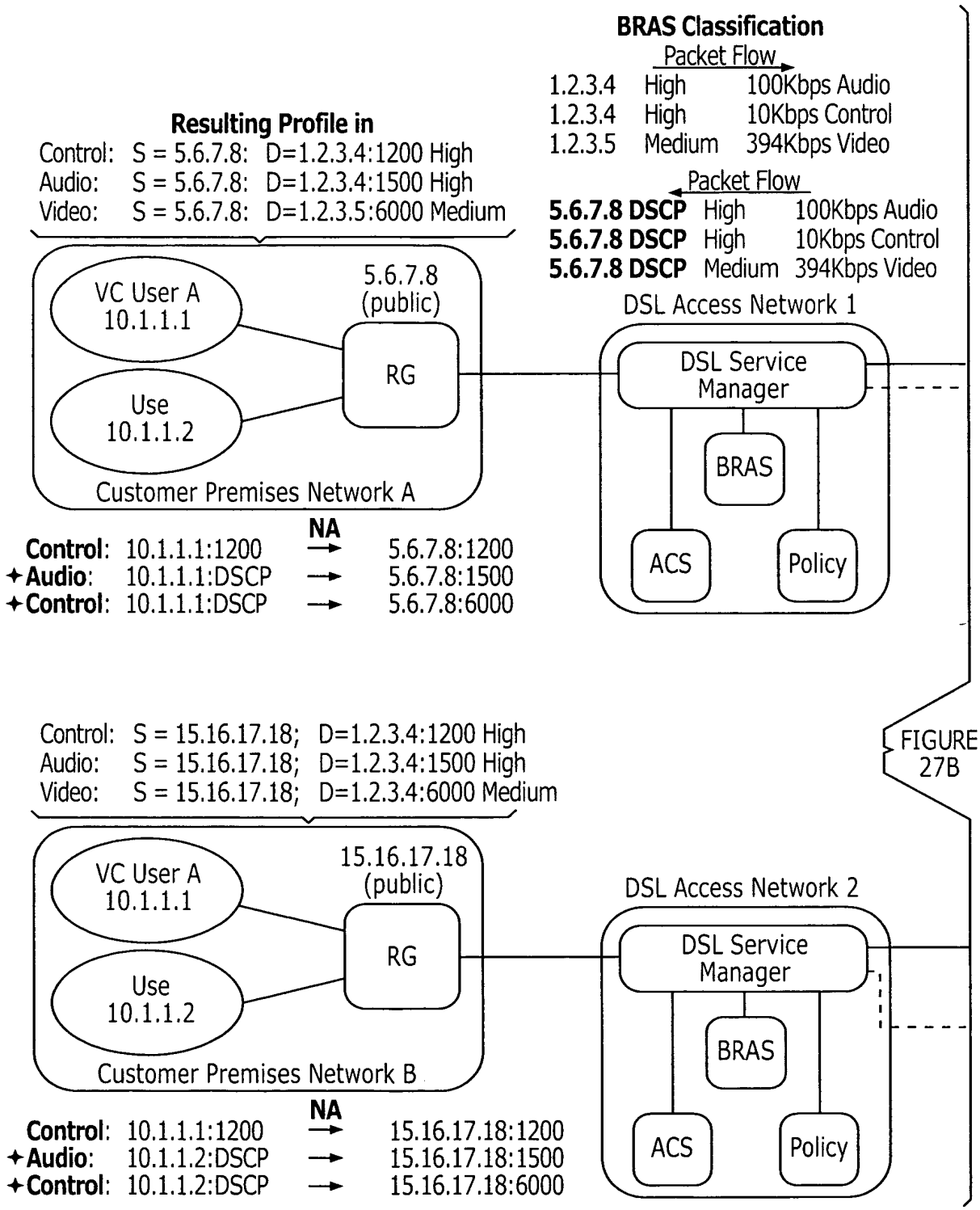


FIGURE 27



✦These flows are set up dynamically at the VC client and the DSCP are assigned for the audio and the video streams. The ALG/NAT maps the 10.X.X.X ports to the corresponding IP address and ports for audio and video specified in the ACS profile based on the DSCP set by the VC client. This ensures that the RG, BRAS, and ASP videoconference MCU maintain consistent port information with regard to the various flows.

FIGURE 27A

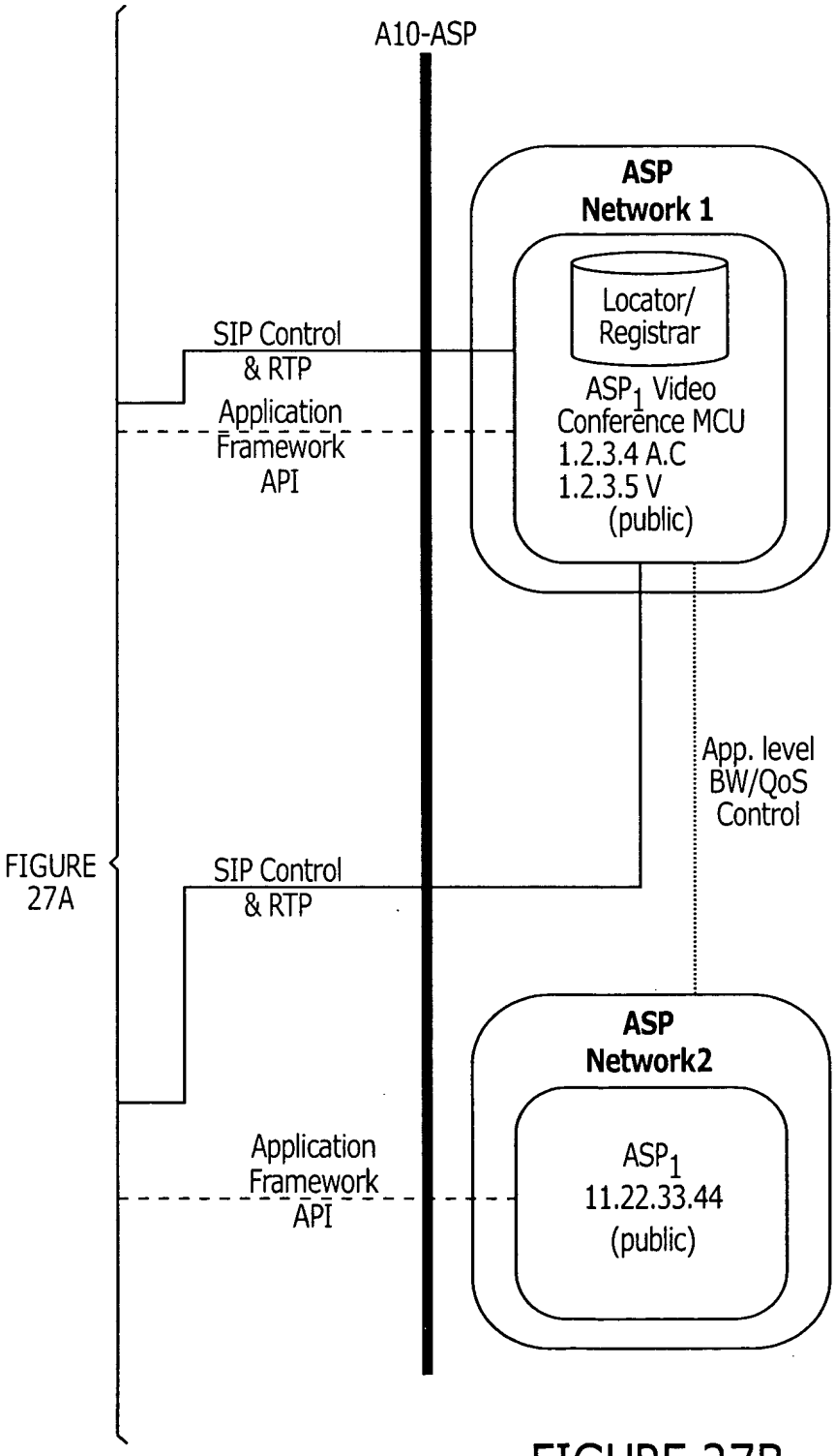


FIGURE 27A

FIGURE 27B

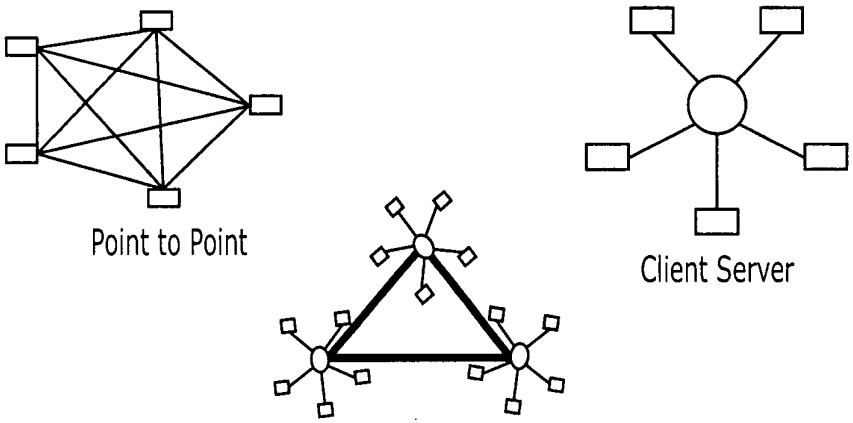


FIGURE 28

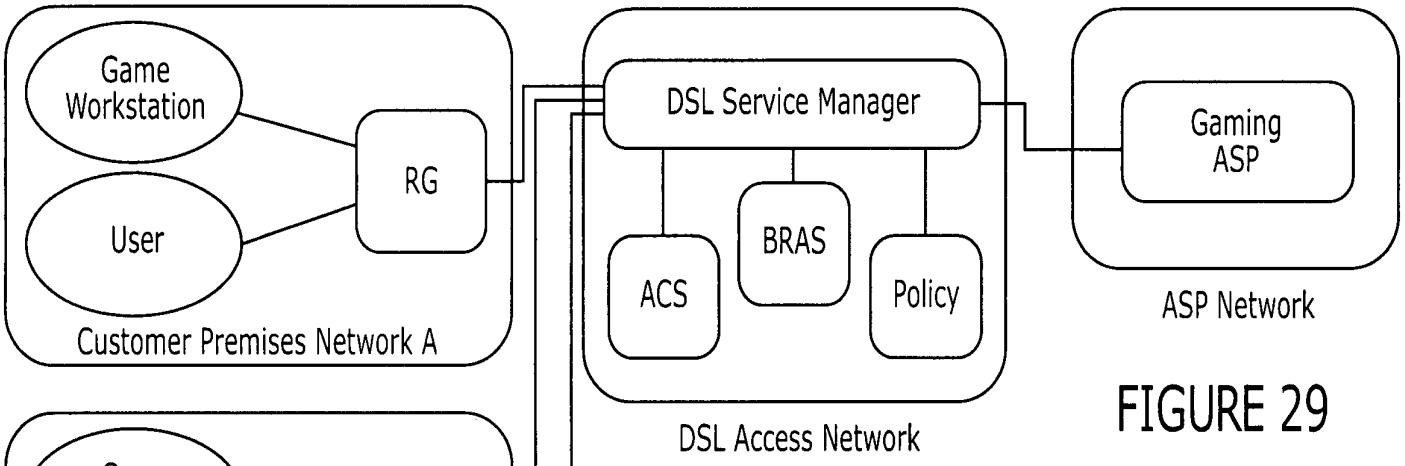


FIGURE 29

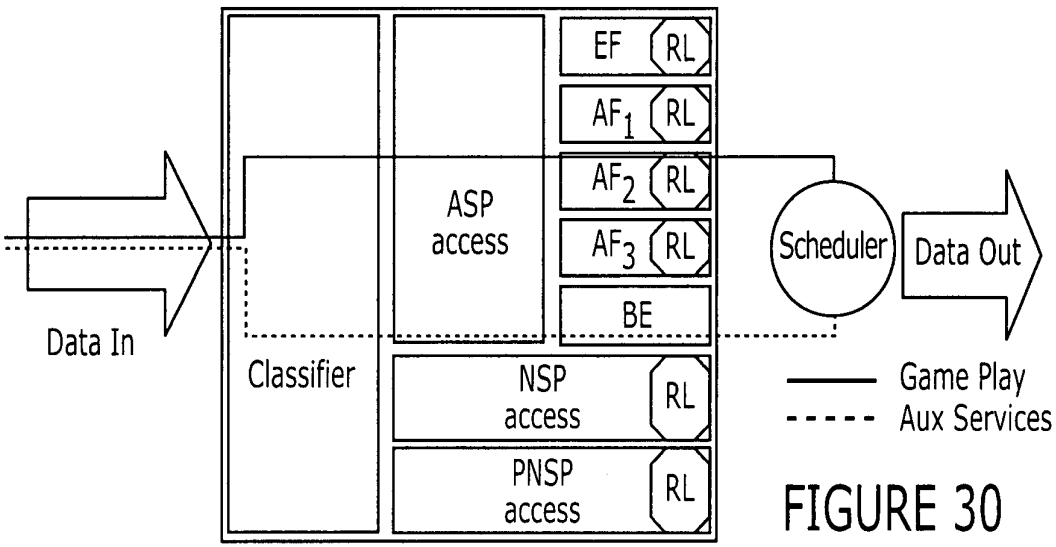


FIGURE 30

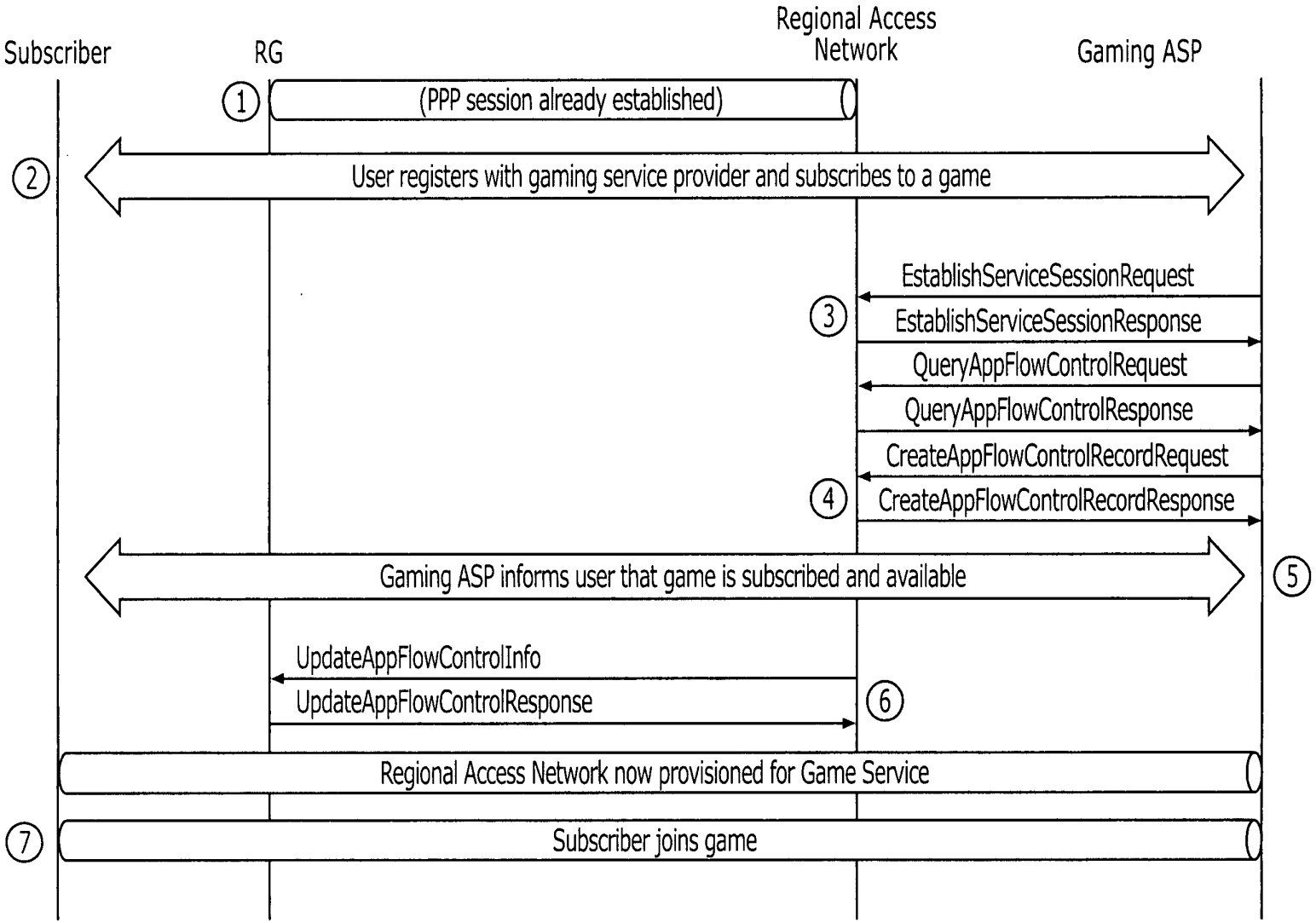

Subscriber
RG
Regional Access Network
Gaming ASP
1
(PPP session already established)
2
User registers with gaming service provider and subscribes to a game
EstablishServiceSessionRequest
3
EstablishServiceSessionResponse
QueryAppFlowControlRequest
QueryAppFlowControlResponse
CreateAppFlowControlRecordRequest
4
CreateAppFlowControlRecordResponse
Gaming ASP informs user that game is subscribed and available
5
UpdateAppFlowControlInfo
UpdateAppFlowControlResponse
6
Regional Access Network now provisioned for Game Service
7
Subscriber joins game

FIGURE 31

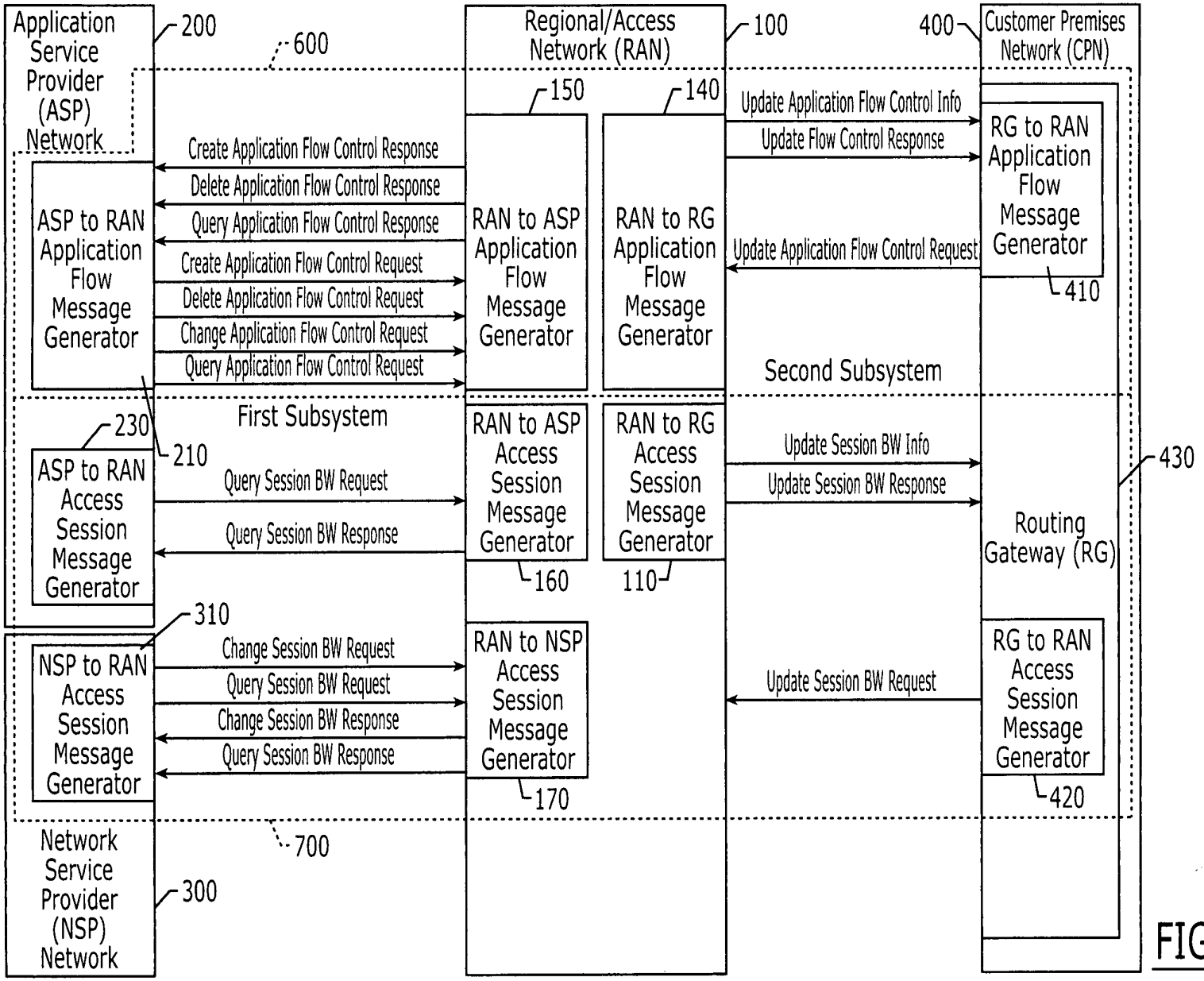

Application Service Provider (ASP) Network
200
600
Regional/Access Network (RAN)
100
400
Customer Premises Network (CPN)
150
140
Update Application Flow Control Info
Update Flow Control Response
RG to RAN Application Flow Message Generator
410
Create Application Flow Control Response
Delete Application Flow Control Response
Query Application Flow Control Response
Create Application Flow Control Request
Delete Application Flow Control Request
Change Application Flow Control Request
Query Application Flow Control Request
ASP to RAN Application Flow Message Generator
RAN to ASP Application Flow Message Generator
RAN to RG Application Flow Message Generator
Update Application Flow Control Request
Second Subsystem
First Subsystem
230
210
RAN to ASP Access Session Message Generator
RAN to RG Access Session Message Generator
Update Session BW Info
Update Session BW Response
430
Query Session BW Request
Query Session BW Response
ASP to RAN Access Session Message Generator
160
110
Routing Gateway (RG)
310
Change Session BW Request
Query Session BW Request
Change Session BW Response
Query Session BW Response
NSP to RAN Access Session Message Generator
RAN to NSP Access Session Message Generator
Update Session BW Request
RG to RAN Access Session Message Generator
170
420
700
Network Service Provider (NSP) Network
300

FIG. 32A

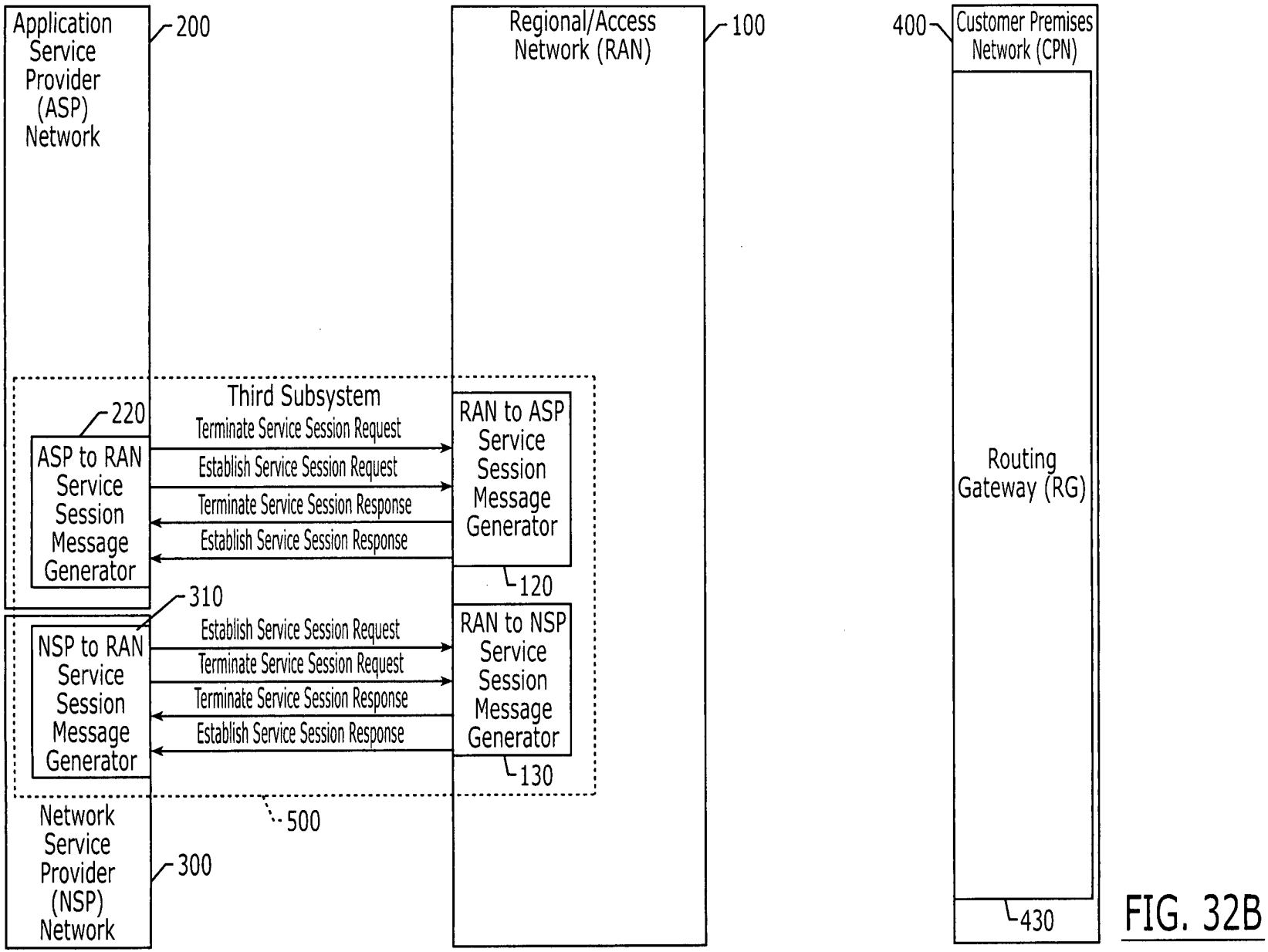

Application Service Provider (ASP) Network
200
Regional/Access Network (RAN)
100
400
Customer Premises Network (CPN)
Routing Gateway (RG)
430
Third Subsystem
220
ASP to RAN Service Session Message Generator
Terminate Service Session Request
Establish Service Session Request
Terminate Service Session Response
Establish Service Session Response
RAN to ASP Service Session Message Generator
120
310
NSP to RAN Service Session Message Generator
Establish Service Session Request
Terminate Service Session Request
Terminate Service Session Response
Establish Service Session Response
RAN to NSP Service Session Message Generator
130
500
Network Service Provider (NSP) Network
300

FIG. 32B

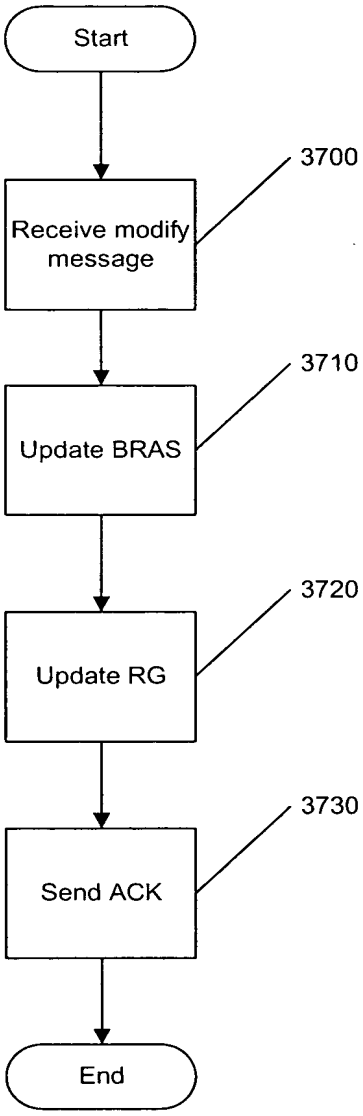

Start
3700
Receive modify message
3710
Update BRAS
3720
Update RG
3730
Send ACK
End

Figure 33